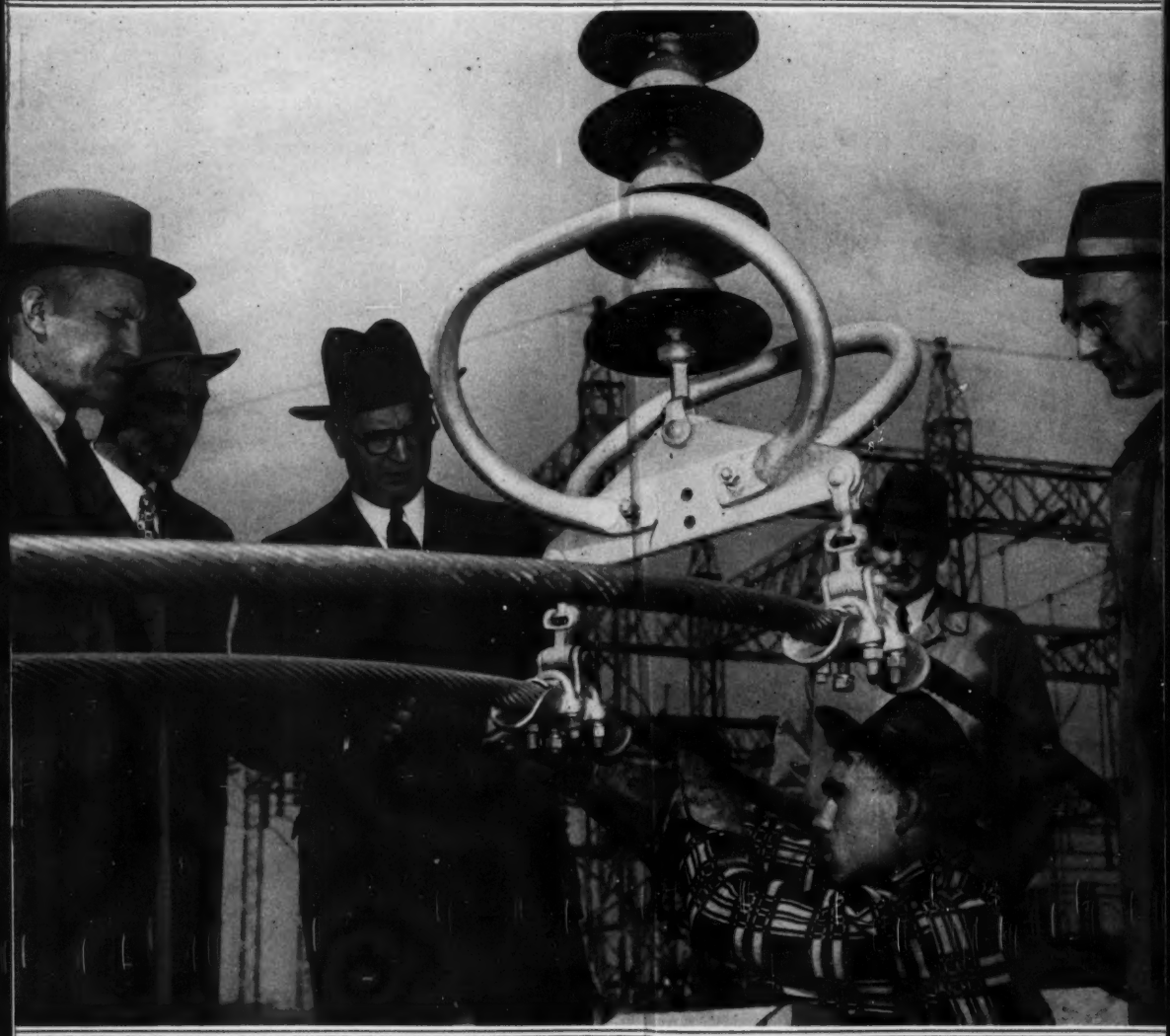
ELECTRICAL WEST

May 1952
25 Cents



Water, Water Everywhere, Page 67
Appliances, Page 94

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

FEATUR
SHOWI

By stressing the particular features of the various sparkling, efficient and economical electric ranges on the market today, we believe that the series of advertisements shown here will help a lot in bringing customers into dealers' stores.

It goes without saying that *all* electric ranges have the same fundamental advantages over any other method of cooking. But an electric range is a personal, dependable and unfailing assistant to the homemaker. And these advertisements point out that, no matter what her individual requirements and preferences may be, there is a range exactly suited to her needs.

It's an old and highly successful formula—Edison tells them and the dealer sells them!

Speaking of ranges... have you seen the latest?
OF COURSE—IT'S ELECTRIC!
ELECTRIC is the word for dinner, better water heaters, too!
SOUTHERN CALIFORNIA EDISON COMPANY
Speaking of ranges... have you seen the latest?
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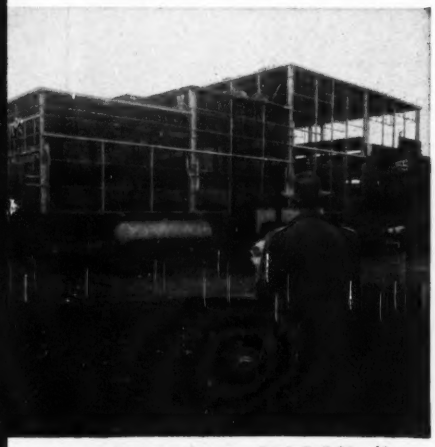
ELECTRIC is the word for dinner, better water heaters, too!
SOUTHERN CALIFORNIA EDISON COMPANY

Edison

SOUTHERN CALIFORNIA EDISON COMPANY

Turbine production board showing scheduled deliveries of more than one large unit a week is checked by W. Pruessman, Manager of Manufacturing, Large Turbine Dept. and L. E. Newman, Manager of Marketing. Square indicators show units complete through April, 60% complete through May.

G-E turbine output to top 5,000,000 kw in '52



Larger in area than two football fields, this new addition to the Schenectady turbine plant will provide extra capacity to take care of expanding demands.

Shipments averaging 5 wks. ahead of contract dates as utilities push expansion programs

Pointing up the rapid advances being made by the electric utility industry in keeping ahead of expanding demands for electric power, G-E production of large turbine-generators will hit a new high of 5,000,000 kw for 1952.

Five times the average production of any prior expansion period, this record output is evidence of the part being played by General Electric in helping the electric power industry speed its present multi-billion dollar expansion program.

Also of interest is the fact that turbines manufactured during 1951 were completed on the average five weeks ahead of contract dates.

With a new 78,000 square foot addition to the Schenectady turbine plant now nearing completion, even greater production—estimated at over 6,000,000 kw—is projected for 1953.

Through the steady growth and improvement of its turbine manufacturing facilities, General Electric expresses its confidence in the continued healthy expansion of the electric utility industry. General Electric Co., Schenectady 5, N. Y.

301-192

MORE POWER TO AMERICA

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

MAY 1952

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-fourth year of publication

VOL. 108 NO. 5

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor
Peggy Boyer, Assistant Editor
Walter C. Heston, Engineering Editor
John Cootz, Typography

Next Month

June is our big annual Convention-in-Print issue. This year it will have a number of excellent pieces in addition to the association presidents' messages.

Of particular interest will be an article on the Colorado River controversy by a big-name national writer. We are very proud to have been able to sign up this article. We hope to have something, too, on controversial Hells Canyon.

Planned also is a piece by an authority on employee relations. Servicing policy on ranges is a subject on which there is difference of opinion. Should the utility farm out this work or perform it itself? Both sides of the question will be discussed.

An article on the economics of high-voltage transmission should interest a large number of readers.

With the lifting of the TV ban, nearly every community in the West will be able to have television soon. The impact on the whole electrical industry will be profound. We expect to interpret this for readers.

Problems of the electrical contractor will be treated, perhaps it will be "How to Live with Regulation and Service."

Regular features will round out the issue. These will include the Sales Guide News Letter, the Contractors' News Letter and news of the industry and its people.

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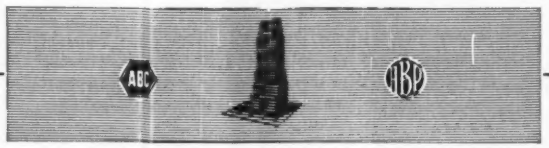
ADVERTISING REPRESENTATIVES

Chicago (11) . . . . . Michael I. O'Connell, 520 N. Michigan Ave.
Cleveland (15) . . . . . Frank J. Seiler, 1510 Hanna Bldg.
Los Angeles (17) . . . . . Carl Dysinger, 1111 Wilshire Blvd., MA 6-4323
New York (36) . . . . . Walter Klein, 330 W. 42nd St.
San Francisco (4) . . . . . Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600



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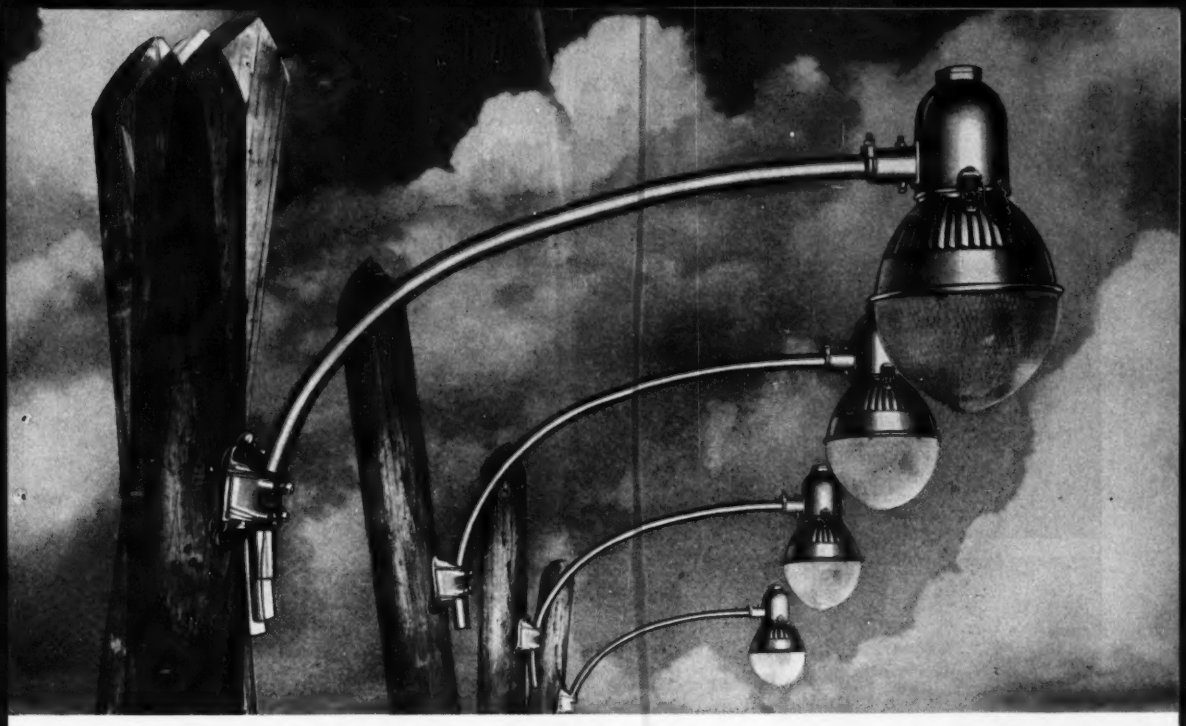
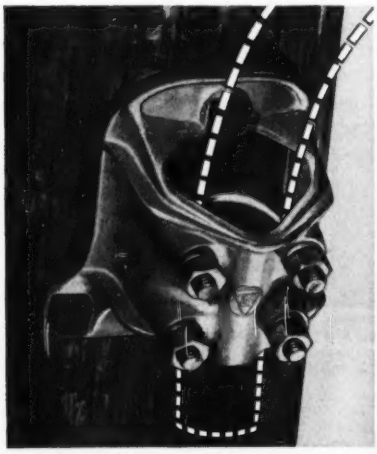


Luminaires Easier to Align With L-M's New Adjustable Bracket

Features integral plumbing for wide ranges of pole rake . . . clean, modern lines . . . easy installation and wiring . . . minimum pole-space requirement.



Really rigid: **the pole plate is a sturdy casting, either steel or aluminum, rigidly held to the pole with a machine bolt at the top and two lag screws below. Two U-bolts grip the bracket firmly. It requires a minimum of pole space.**

Here is a new single curve upsweep bracket that makes it easy for you to plumb the luminaire. The bracket has pleasing, functional design; it is made in either steel or aluminum; it is easy to install and wire; and it is available with all conventional end-fittings.

Easy to adjust: the curved pipe is clamped into the pole plate with two U-bolts. By moving the pipe up or down, you change the angle to compensate for almost any degree of pole rake. Then you tighten the U-bolts, and the bracket remains rigid in the desired position.

Easy to install: the pre-wired assembly is attached to the pole by means of an open-slotted pole plate, which fits over a single machine bolt at the top. The entire weight of the assembly is firmly held this way, while you install two lag screws at the bottom of the pole plate. This mounting requires a minimum of pole space.

Easy to wire: the one piece bracket is a single curve, with smooth contour. There are no sharp bends or extra units through which the wiring must be guided. You just slide the wire right through—it saves time and helps assure a good job. Ask the L-M Field Engineer for full information, or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LM **LINE MATERIAL**
Street Lighting

84

Incombustible...

That's why TRANSITE® DUCTS confine burn-outs and protect adjacent cables

DESPITE modern precautions, the burn-out is still a potential hazard. Consequently, cables should be given the maximum fireproof protection that Transite Ducts provide.

Transite Ducts confine burn-outs, safeguard adjacent cables from damage and reduce the possibilities of panic and explosion because they are incombustible throughout. Made of nonflammable asbestos and cement, Transite Ducts will not burn, smoulder or generate smoke or fumes. They cannot contribute to the formation of explosive gases.

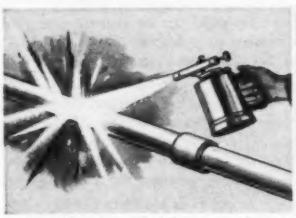
Nowhere is the fireproof protection of Transite Ducts so necessary as in such vital locations as subways, tunnels and power plants.

As the panel below shows, incombustibility is only one of the advantages of Transite Ducts. For more information, write Johns-Manville, Box 60, New York 16, N. Y.

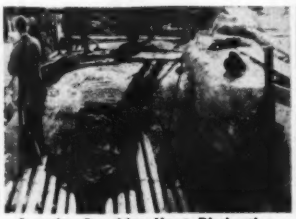
4 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

1. **Corrosion-Resistant.** Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.
2. **Permanently Smooth Bore.** Transite makes long cable pulls easy. Danger of damage to cables is also minimized.
3. **Easy To Install.** Transite Ducts are light weight, easy to handle. Joints are quickly made. And long 10-ft. lengths reduce the number of joints in line.
4. **High Thermal Conductivity.** Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.

In Subways, where passenger safety is paramount, fireproof Transite Ducts will, in the event of a burn-out, confine it and reduce the hazard of panic.



Transite Does Not Burn, smoke or fume because its ingredients, asbestos and cement, will not support combustion. It cannot contribute to the formation of explosive gases.



Transite Provides Heat Dissipation, Too. In addition to providing fireproof construction, Transite Ducts permit cables to run cooler, reducing I^2R losses.

Photograph courtesy of Triborough Bridge and Tunnel.

In Vehicular Tunnels, if a burn-out should occur, Transite Ducts limit damage, permit speedier repair and an earlier re-opening for traffic.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

Twin Highlite—For high levels of illumination from a minimum number of outlets in high bay industrial interiors. Available with porcelain enamel or Alzac aluminum finish.

V-51 Convertible Vapor-tight Fixture—Exclusive Unit Assembly makes receptacle, globe, guard instantly detachable for relamping. Converts to higher or lower wattages just as easily.

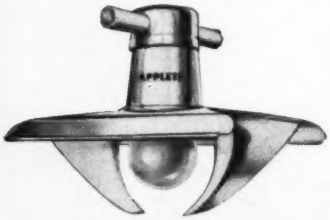
SAVE

Money—Materials—Man-Hours with APPLETON INDUSTRIAL LIGHTING

Type EFU—First and still finest Explosion-Proof Lighting Fixture. Available for two 40 Watt, 48" lamps or two 100 Watt, 60" lamps.

Pat. No. 2,393,202

RLM Standard Dome Reflector—Made of Rust-resisting iron with three coats of baked porcelain enamel. Sectionalized construction permits easy installation, convenient servicing.



Stocklite—Provides perfect illumination for shelves and bins in stock rooms.

Fewer rejections . . . increased worker output . . . greater safety . . . less spoilage resulting from eye fatigue—these are only a few of many advantages that are yours with good plant lighting.

Appleton Industrial Lighting Equipment is precision-engineered to direct the *right intensities* of light to the *right places.* Combining expert Appleton design with rugged durability, these fixtures provide finely coordinated lighting systems at minimum initial cost and lowest possible service and operating expense.

Appleton excells in the manufacture of lighting equipment for hazardous locations and explosion-proof applications. For any industrial lighting requirement, contact Appleton, pace-setting manufacturer of electrical equipment for nearly half a century.

Sold Through Electrical Wholesalers

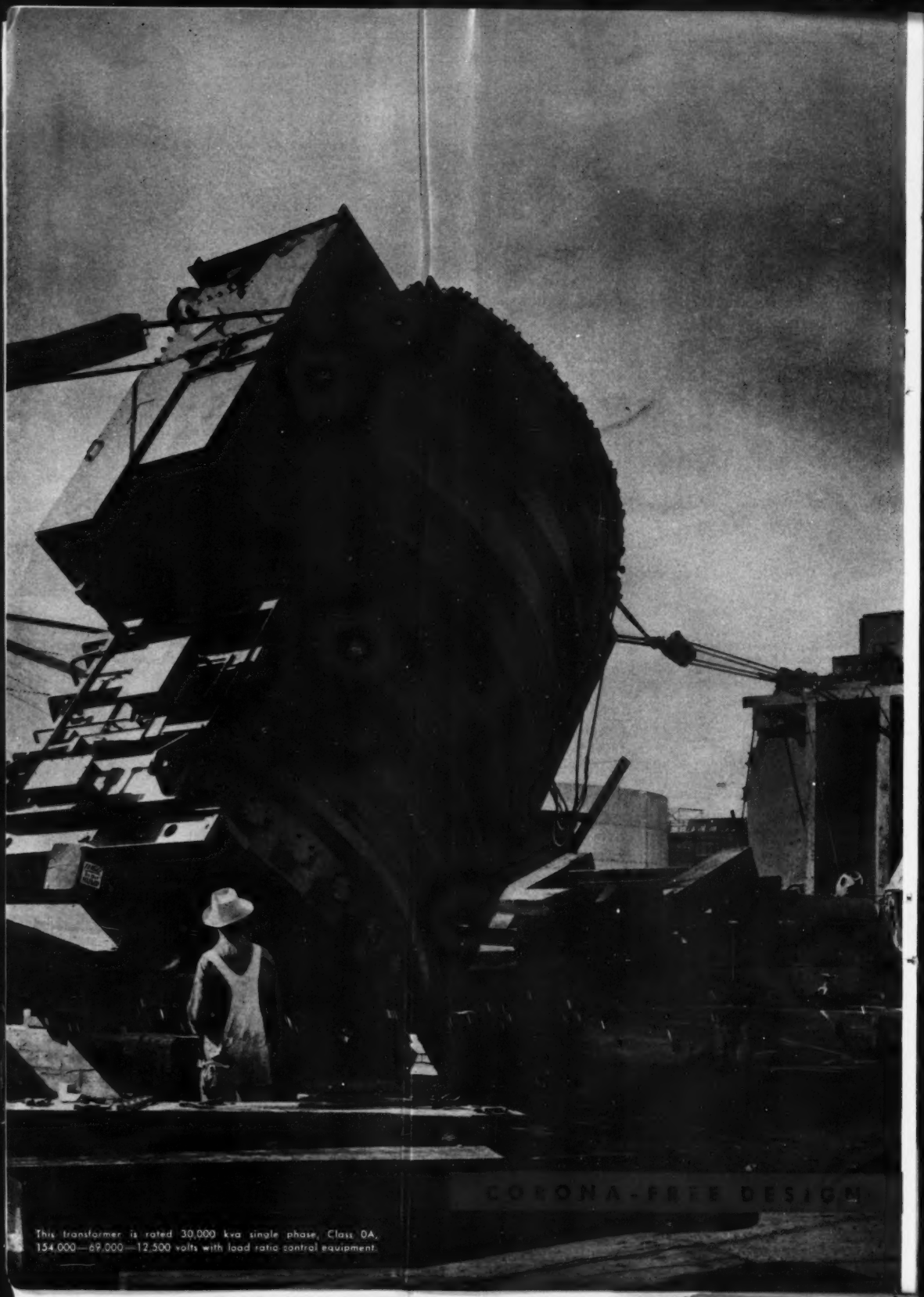
APPLETON ELECTRIC COMPANY

1709 Wellington Avenue • Chicago 13, Illinois

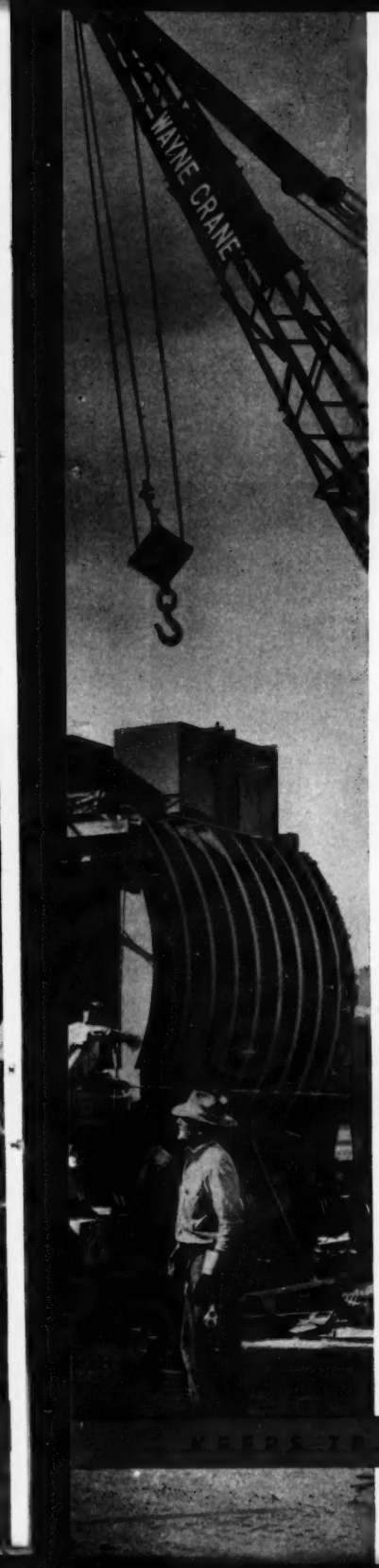
Field Engineers: NEW YORK, 50 Church St. • DETROIT, 3049 E. Grand Blvd. • CLEVELAND, 1836 Euclid Avenue • SAN FRANCISCO, 655 Minna St. • ST. LOUIS, 227 Frisco Bldg. • LOS ANGELES, 100 N. Santa Fe Ave. • ATLANTA, 724 Boulevard, N. E. • BIRMINGHAM, 809 Brown-Marx Bldg. MINNEAPOLIS, 305 Fifth St., S. • PITTSBURGH, 414 Bessemer Bldg. • BALTIMORE, 100 E. Pleasant St. BOSTON, 10 High Street • DENVER, 1921 Blake Street • PHILADELPHIA, 2013 Locust Street CINCINNATI, 608 American Bldg. • HOUSTON, 717 M. & M. Bldg. • HAVANA, Cuba, Malecon No. 9 BINGHAMTON • DALLAS • INDIANAPOLIS • KANSAS CITY • ORLANDO • MILWAUKEE NEW ORLEANS • SEATTLE • PORTLAND, ORE.

Export Representatives: International Standard Electric Corp., 67 Broad St., New York 4, N. Y.

APPLETON ELECTRIC PRODUCTS



This transformer is rated 30,000 kva single phase, Class OA, 154,000—69,000—12,500 volts with load ratio control equipment.



THEY STAY YOUNG LONGER

with

CORONA

DESIGN

CORONA IS ALWAYS a source of danger to your transformer. It produces local heat and chars insulation, causing the insulation to become electrically conducting.

Corona can develop any time due to voltage stresses within your transformer. When it does, your transformer will age prematurely.

SELECT CORONA-FREE DESIGN . . . because the performance you specify today is the performance you will need tomorrow and for years to come. You'll get transformers that stay young — longer! Allis-Chalmers, Milwaukee 1, Wis.

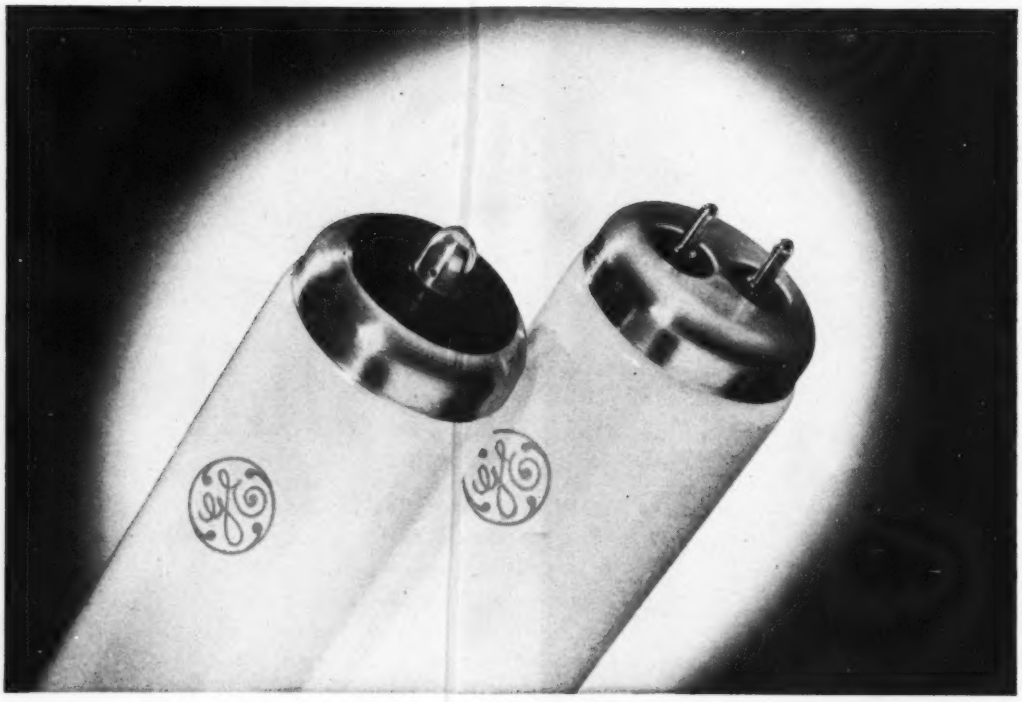
A-3716

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

There is a difference in fluorescent lamps

This is one . . . found in G-E lamps, of course!



THE ends of these fluorescent lamps are aluminum. Rough handling doesn't crack them. Cold can't shrink them enough to make them crack the glass tube. They can be heated hot enough to make a tighter seal. They eliminate one reason why fluorescent lamps sometimes fail before they should. They're on G-E lamps, of course. This is one of many basic differences that make General Electric your customers' best buy in fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC

START

using CLARK Bulletin 6018 and 6020 Type "CY" Combination Starters which combine a Safety Switch or Circuit Breaker and Motor Starter in one cabinet.

STOP

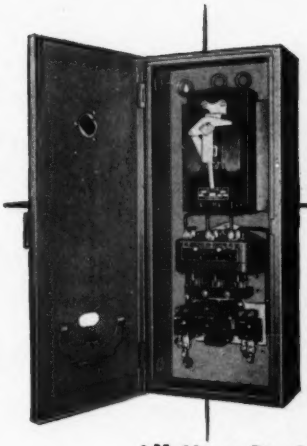
the extra cost of installing and wiring separate Safety Switches or Circuit Breakers with Motor Starters.

START

saving time and insuring production by using CLARK Type "CY" starters for your AC motors.

STOP

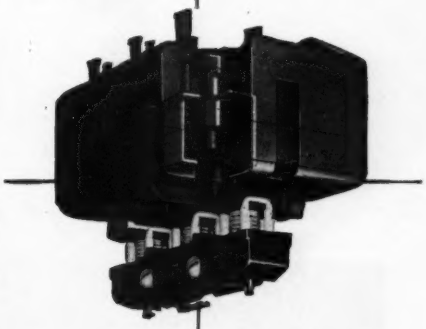
high cost caused by time out for maintenance and repair.

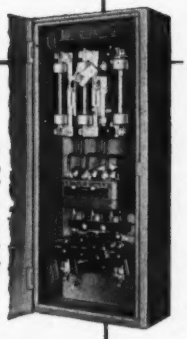


CLARK Bulletin 6020 Size 2 Type "CY" Magnetic Combination Motor Starter with Circuit Breaker.

All New Design

Clark Type "CY" Starters Sizes 2 and 3 are equipped with strong multi-turn magnetic blow-out coils and twin-break contacts. Contacts are of a special silver alloy selected for its high melting point, non-welding and arc-quenching properties. Contacts require no cleaning.





CLARK Bulletin 6018 Size 2 Type "CY" Magnetic Combination Starter with Safety Switch.

CLARK

Type "CY" starters are engineered and built for rugged service—for more time "on the job" and less "time out for repairs and maintenance."

Available in all types of enclosures to meet every industrial requirement.

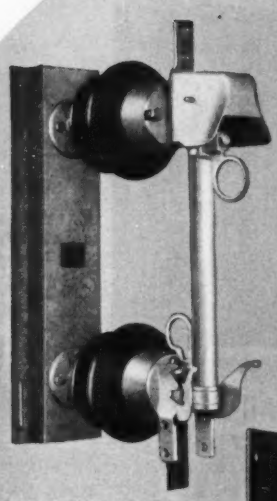
New Arc Quenching Principle

The arc in Type "CY" starters Sizes 2 and 3 is extinguished by the effect of the blow-out coils, *concentric with the contacts*. The steel arc chamber and center stud (colored green in sketch above) form the magnetic field which rotates the arc—either lengthening or confining it. Since the arc moves continuously on the contact surfaces, burning and pitting is minimized and contact life greatly increased.

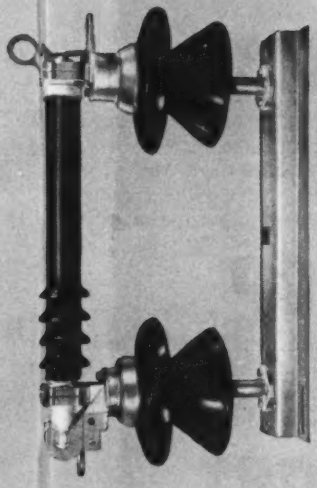
Let us show you how CLARK "CY" STARTERS assure more continuous production and lower maintenance.

THE CLARK CONTROLLER CO.

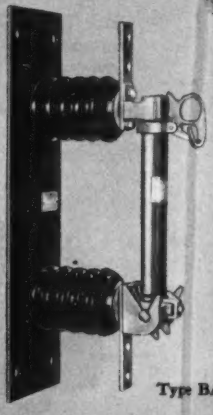
ENGINEERED ELECTRICAL CONTROL • 1146 EAST 152ND STREET, CLEVELAND 10, OHIO



Type DBA (Drop-out) Power Fuse



Type BA Power Fuse

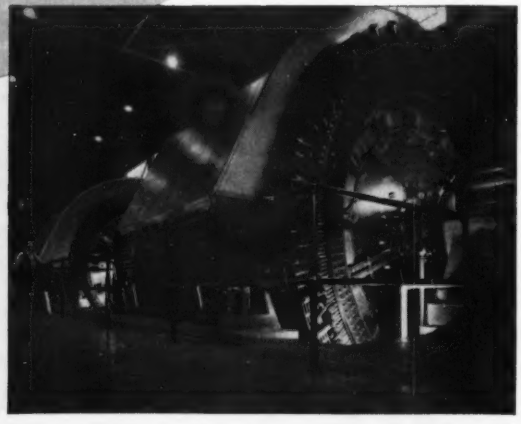


Type BAL (Current-Limiting) Power Fuse

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

THE SEAL THAT SAFEGUARDS YOUR INVESTMENT

In a typical High Power Laboratory test, a Type DBA Fuse is shown interrupting the equivalent of a 3-phase, 1,000,000-kva fault. An instant after the photo was taken, the drop-out element operated, isolating the circuit.



Source of the laboratory's tremendous power are these two 60,000-kva generators. When paralleled, they are capable of delivering a 3-phase fault of 2,500,000 kva, or a single-phase fault equivalent to 4,000,000 kva.

ONLY *CONTROLLED* LABORATORY TESTING CAN PRODUCE THESE RESULTS:

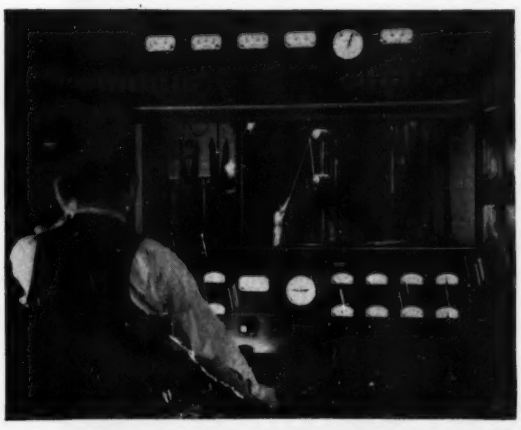
1. Application of Boric Acid Idea to Power Fuses

2. Proved Operation under all Circuit Conditions

In 1931, the Westinghouse High Power Laboratory—already five years old—played a major role in the development of the boric acid fuse. Conducting multiple tests under controlled conditions not available in the field, Westinghouse Laboratory technicians proved conclusively the soundness and superiority of the boric acid interrupting principle. The result is a complete line of low-cost protective devices proved to a degree unattainable by other means of testing. Considering the extent of your investment in fuse-protected equipment, this extra measure of sureness is an invaluable advantage. And it's one you get only when you specify Westinghouse.

Continued High Power Laboratory testing has also widened the application of this economical means of short-circuit protection. From the first Type BA Fuse, low-cost interrupting capacity has advanced with the development of Types DBA (drop-out) and BAL (current-limiting) until now 138,000-volt fuses that interrupt one million kva are available.

FOR COMPLETE INFORMATION on Westinghouse Power Fuses ask for a copy of Booklet B-5469. Contact your Westinghouse representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60781



From this control desk, a single operator guides all high power testing facilities. The control room also houses indicating instruments, protective relays, sequencing drums, and oscillographs which simultaneously record as many as eighteen variables.

See "Electrical Proving Ground"

...the dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details, see your Westinghouse Representative, or write: Westinghouse Film Division, Box 868, Pittsburgh 30, Pennsylvania.

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

YOU CAN BE SURE...IF IT'S Westinghouse

POWER FUSES

THE TWO E·M·T FITTINGS

THAT ARE EASIER TO USE— SAVE MONEY TOO!

Cross Section Showing Indentations.

Easier to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job a better job. It is only natural that Briegel Fittings are the most widely used E.M.T. connectors and couplings.

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

Distributed by

The M. B. Austin Co., Northbrook, Ill., Clayton Mark & Co., Evanston, Ill., Clifton Conduit Co., Jersey City, N. J., General Electric Co., Bridgeport, Conn., The Steelduct Co., Youngstown, Ohio, Enameled Metals, Pittsburgh, Penn., Wagner Malleable Products Co., Decatur, Ill., Kondu Mfg. Co., Ltd., Preston, Ont.

No "Cover" Charge Here!

THE INDUCED-DRAFT FAN MOTORS look pretty small right out in the open air at the base of the towering stacks. But with today's building costs there would have been nothing small about the "cover" charge for brick and mortar walls and a steel-braced roof to house the motors.

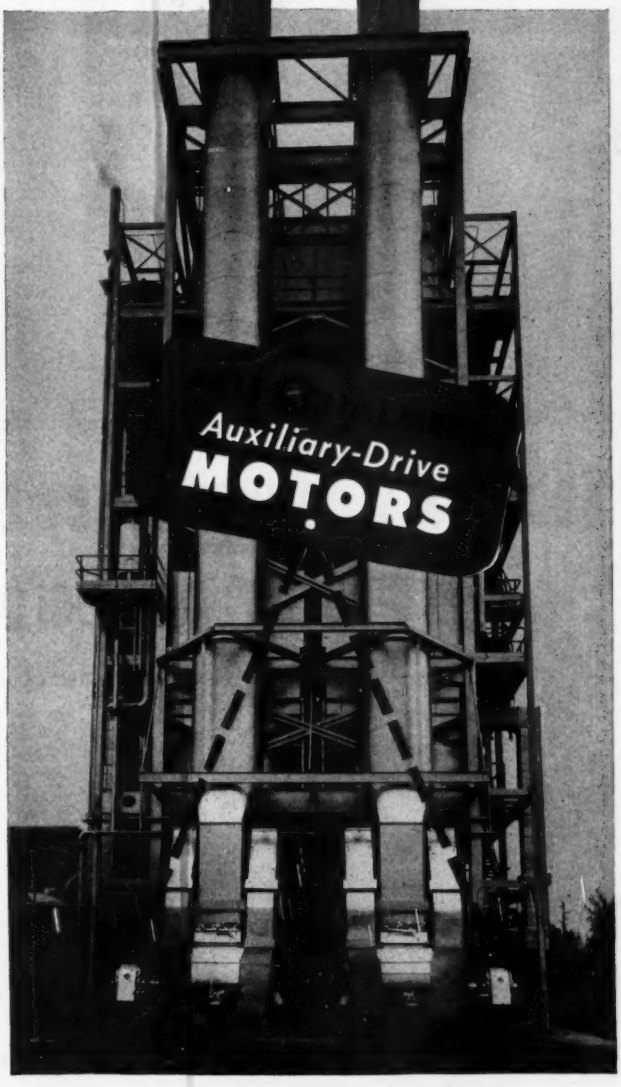
Fortunately, modern Allis-Chalmers auxiliary-drive motors need no costly enclosures.

You can count on Allis-Chalmers motors for the kind of operation you need for continuous power generation . . . because A-C has the experience essential to designing and building motors for outdoor use.

For many years, A-C has been supplying splash-proof motors for a variety of outdoor applications. Since 1946, *tube-type* totally-enclosed fan-cooled motors have been available for operation under the most severe conditions indoors or out. And Allis-Chalmers is now offering *weather-protected* motors especially developed for modern outdoor power plants.

Talk Over Your Needs

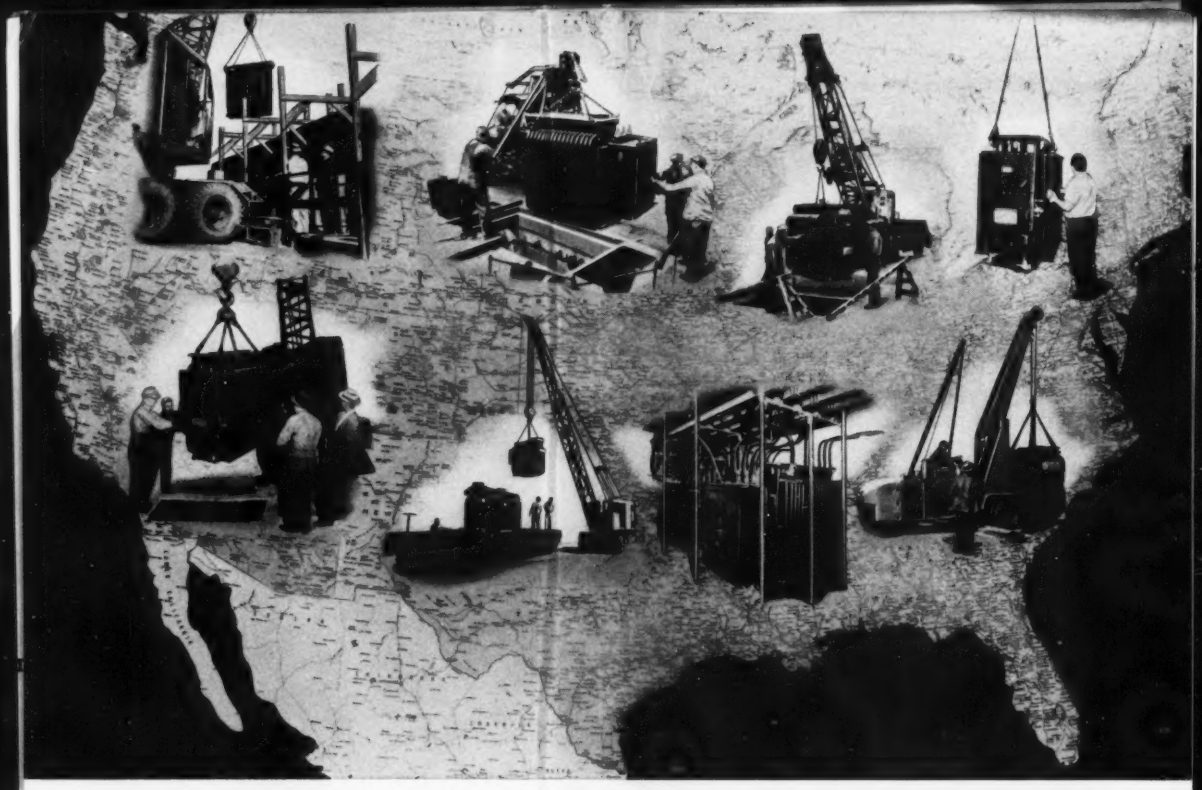
All three types are available in sizes and speeds to meet all major auxiliary-drive requirements. Your nearby A-C representative can help you select the motors that will best fit your needs for money-saving outdoor installations. Allis-Chalmers, Milwaukee 1, Wis.



Two 450-hp, 695-rpm, splash-proof cage motors driving induced-draft fans — as well as other Allis-Chalmers auxiliary-drive motors — are installed outdoors at the Natchez Steam Electric Station of the Mississippi Power and Light Company.

A-3653

ALLIS-CHALMERS



Secondary networks key to easy expansion in city after city across the nation

G-E network units added by many utilities . . . often as only step in increasing system capacity

Even today's rapidly expanding urban loads cause little difficulty in cities where secondary network systems have been installed.

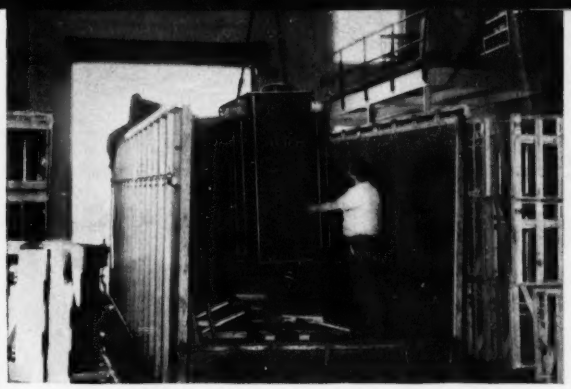
Unlike radial distribution systems, secondary networks permit electric utilities to handle increased loads—foreseen and unforeseen—without resorting to extensive engineering calculations, rearrangement or bolstering of circuits, or juggling of existing loads. And this, in addition to maintaining virtually uninterrupted service and uniformly firm voltage!

The installations pictured on the right clearly demonstrate the ease of meeting load growth once you have gone to a secondary network. In practically every case, all that was necessary to take care of increased loads was additional network units. Where required, utility crewmen constructed transformer vaults; installed new G-E network transformers; and tapped them in to reinforce existing secondary grids!

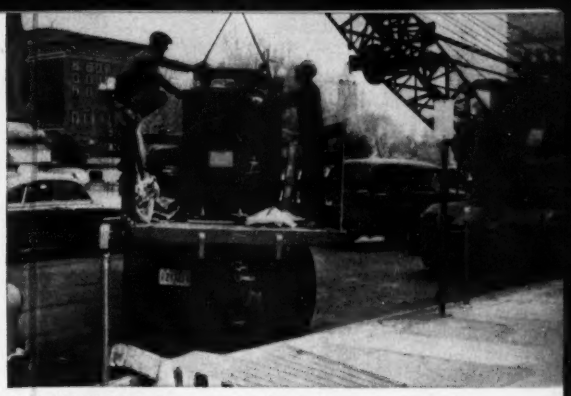
If you're struggling to accommodate new loads by perpetuating a radial system and your load density has risen to approximately 10,000 to 15,000 kva per square mile, it may be time for you to investigate the flexibility and economy of a secondary network.

When you do, be sure to consider the extra advantages of G-E standardized network equipment. Quantity production methods reduce manufacturing and assembly time. You get faster delivery at lower prices. And refinement in design—made possible by quantity production—means lower installation and maintenance costs.

For help in solving your network problems and for complete information on G-E network transformers, see your local G-E representative. Or write for Bulletins GEA-5024 and GEA-2017. *General Electric Company, Schenectady 5, New York.*



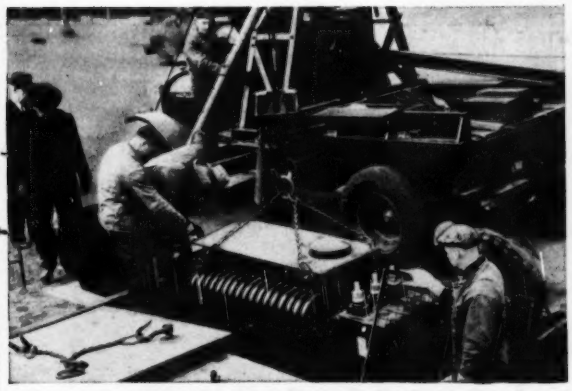
PROVIDENCE Narragansett Electric Company prepares to add another G-E network unit. An overhead crane eases unit into truck for transportation to vault site.



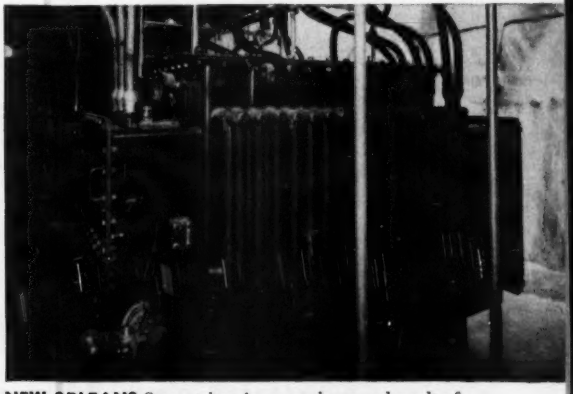
INDIANAPOLIS Crewmen of the Indianapolis Power & Light Company rig a new G-E network transformer to be transferred to sidewalk vault on North Pennsylvania Street.

SACRAMENTO And still another General Electric network transformer being added. Workmen are guiding suspended unit towards vault opening.

SAN FRANCISCO adds capacity in heart of "down town" district. G-E standardized network unit enabled Pacific Gas & Electric to construct vault of minimum size at Pine St.



ST. LOUIS and the location is Clark Avenue and 15th Street. Union Electric's crew will soon have this standard G-E network unit in place and connected to secondary grid.

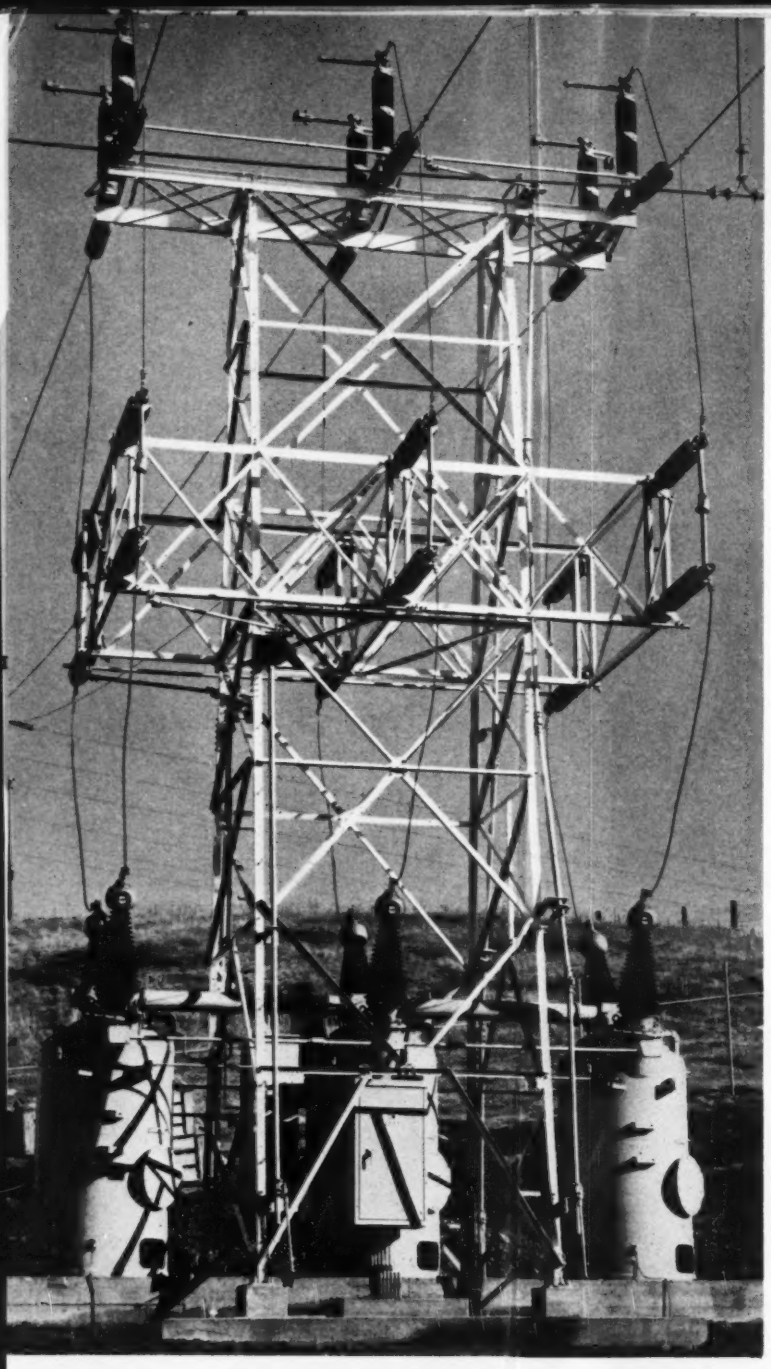


NEW ORLEANS Scene taken in an underground vault of the New Orleans Public Service system shows G-E network units connected up and ready to handle their share of load.

GENERAL ELECTRIC

402-119

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



Easy..

. . to Operate

. . to Install

. . to Maintain

Schwager-Wood Type DSB switches provide an economical solution to circuit-breaker by-pass installation.

Pictured is a new switching tower for The California Oregon Power Company incorporating three Type DSB 115-Kv 600-amp group-operated disconnecting switches.

For price and delivery and for further information on the design features that make Type DSB the most efficient switch for this and similar operations write or call your nearest Schwager-Wood representative.

SCHWAGER-WOOD CORPORATION

8024 S.W. 35th AVENUE, PORTLAND 19, OREGON

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Box 67-C
Pasadena, California
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CLARENCE W. SILVER COMPANY, 550 West 7th South Street, Salt Lake City 4, Utah, Tel: 3-0206

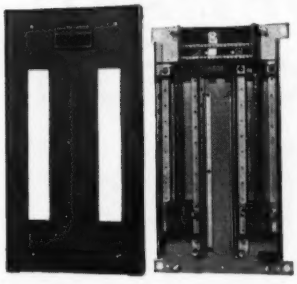
Now, get immediate local delivery on BullDog Panelboards up to 42 circuits

Just 5 *standardized* Electri-Centers now make up 2 complete lines . . . bring you more flexible panels at savings in time, money!

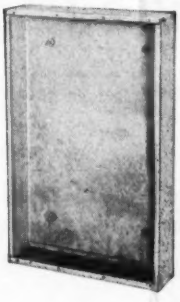
Now, BullDog has standardized panelboards. Just 5 catalog numbers fill every panelboard requirement up to 42 circuits; let you get immediate, over-the-counter delivery from local supplier's stocks on an item that once had to be specially ordered, custom-built and took weeks to get.

BullDog Electri-Center Panelboards save you money, too. They are mass-produced, cost less, offer you famous Pushmatic push-button switching and automatic circuit protection, *plus* complete flexibility to meet your changing electrical requirements.

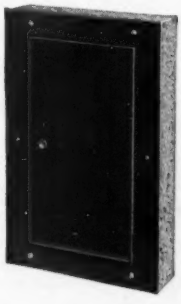
See your local BullDog supplier about these 2 complete, simplified panelboard lines . . . or write BullDog for detailed Bulletin No. 513. Underwriters'-approved. Meet Federal specifications WP 131a Class A.



1 INTERIOR: Your local BullDog supplier now stocks 5 flexible interiors that will fill any panelboard need up to 42 circuits.

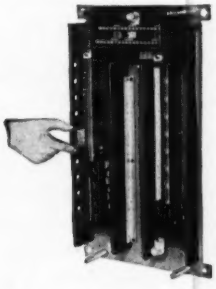


2 BOX: A Code Gauge steel box with ample knockouts is supplied to accommodate each single-phase or 3-phase 4-wire interior.



3 FRONT: Attractive gray fronts that include door (with locks) and trim also supplied on the spot. Either flush or surface type available.

4 PUSHMATICS: You select fully interchangeable Pushmatic circuit breakers according to number desired and ratings needed.



5 FLEXIBLE: Then, insert Pushmatics. Filler plates may be used in spaces where you'll want to add circuits later.

6 COMPLETE: And here is your complete BullDog Panelboard! Delivered and assembled in minutes right to your *exact* specifications.

Write for Descriptive Bulletin No. 513

BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO
PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES

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Paul L. Mullenbach Co.
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Since the introduction of fluorescent lighting...

greatest STEP UPWARD in industrial SEEING COMFORT

...new BENJAMIN "Task Master"

Shatters precedent with a completely new concept of lighting unit design!

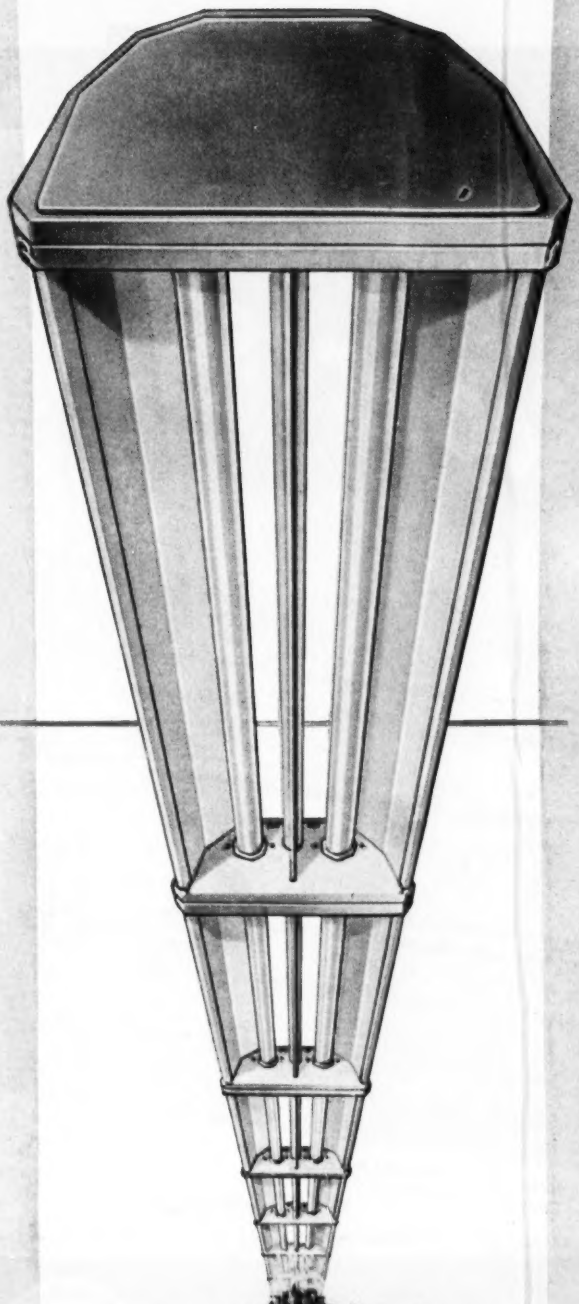
Masters the brightness ratio problem by directing approx. ¼ of light upward!

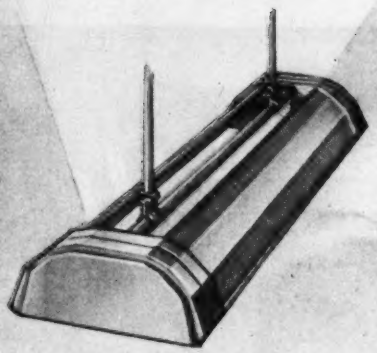
Doubles... even triples... present standards for industrial seeing comfort!

Introduces new methods of installation and maintenance!

Yes, the new Benjamin "Task Master" is the greatest step UPWARD in industrial fluorescent lighting history. It's a step UPWARD to high lighting levels without the discomfort which can often accompany them . . . a step UPWARD to complete freedom from annoying ceiling contrast that may cause excessive brightness ratios. It's a step UPWARD to greater seeing comfort in America's work places! Moreover—"Task Master" represents a great step UPWARD in high-speed installation and trouble-free maintenance, as shown above. Get full details about this greatest step UPWARD in industrial seeing comfort . . . send for FREE "TASK MASTER" Data Bulletin, containing complete specifications. Write:

Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Ill.





3 ways to mount: chain, conduit and sliding hanger suspension (illustrated).

UPWARD ILLUMINATION COMPONENT directs approximately ¼ of light towards the ceiling. In addition to providing more generous **UPWARD** flow of light, this unique construction reduces maintenance expense as it practically eliminates horizontal areas where dust and dirt can collect.

DETACHABLE REFLECTORS are hinged to facilitate easier, more thorough cleaning right on the fixture; or they may be quickly unhinged and replaced with reflectors which were previously cleaned at a bench. 2 simple spring-type clips lock or release each reflector . . . no tools needed.

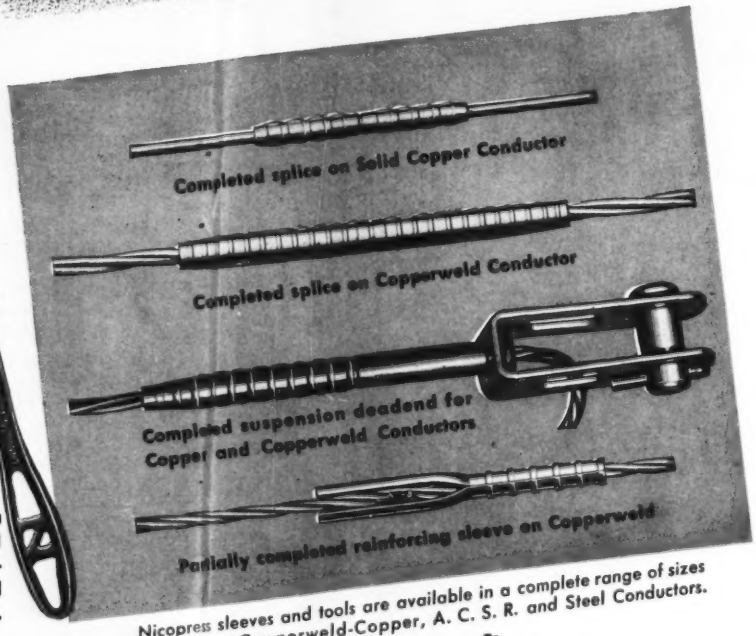
PRE-WIRED . . NO WIRE SPLICING . . All Connections made to Terminal block. No need to run line wire through fixture. Furnished with branch circuit wiring already run through a combination spine support and lamp shield. (Shielding angle is 35°) Just connect line wires to terminals (see picture A above). For continuous line installations, simply connect "jumper" wires to opposite terminal blocks (see picture B).

BALLAST AND TERMINAL BLOCK are strategically located in easily-accessible end sections . . . out of the way for more streamlined appearance.

Of course, **EXCLUSIVE BENJAMIN "SPRINGLOX" LAMPHOLDERS** are standard equipment. They are acknowledged as embodying the most advanced lampholder features. Such as: rugged, all-metal construction and unique, patented spring design for "quick-in, quick-out" lamp maintenance.

"JOB PROVEN"
THE WORLD OVER
Nicopress

Illustration of No. 51 type Nicopress tool with P. & J. Grooves.


Completed splice on Solid Copper Conductor
Completed splice on Copperweld Conductor
Completed suspension deadend for Copper and Copperweld Conductors
Partially completed reinforcing sleeve on Copperweld

Nicopress sleeves and tools are available in a complete range of sizes for Copper, Copperweld-Copper, A. C. S. R. and Steel Conductors.

Nicopress
is the Registered Trade Mark of The National Telephone Supply Company

THE NATIONAL TELEPHONE SUPPLY COMPANY

Connect the service leads . . . plug in the meter . . .

That's all!

The STU Heavy-Duty Socket

There's no need to devise special metering facilities for heavy current applications when you use Westinghouse Transockets. All components are in place . . . complete with secondary wiring—ready for installation . . . all in a single package! Just connect the service leads, plug in the meter . . . that's all.

The STU High-Capacity Socket lets you utilize the full inherent capacity of Westinghouse 50 ampere meters, when installed on services using #4/0 wire. It's now available for polyphase as well as for single-phase applications.

The STS Transocket combines the socket and Type MR current transformers in one compact enclosure . . . handles heavy loads up to 400 amperes.

Both units are ready to install . . . inexpensively . . . easily . . . and take standard S-Type meters.

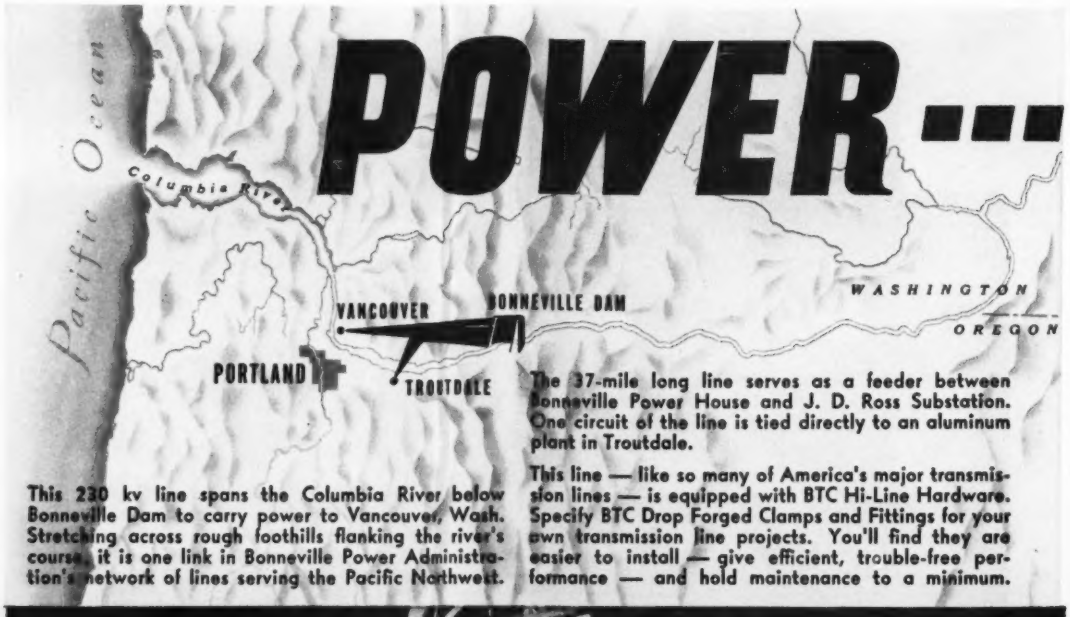
Here's real help! The Westinghouse "Meter Socket Selector," B-5284, makes it easy for you to select the proper socket for any application. It's 20 pages, fully illustrated, covering all types of service . . . all capacities. To get your copy, write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-40426

YOU CAN BE SURE...IF IT'S Westinghouse

METERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif., Los Angeles; Portland; Salt Lake City; Seattle; Denver

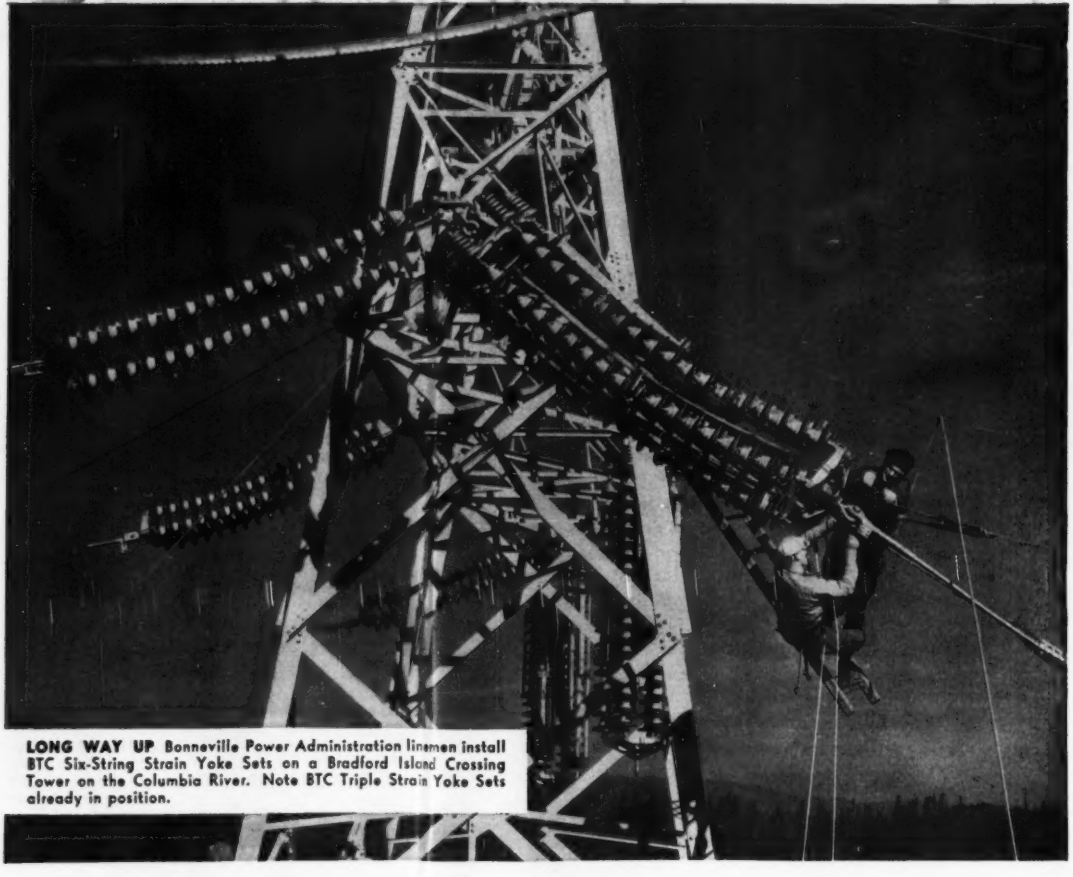
POWER...



This 230 kv line spans the Columbia River below Bonneville Dam to carry power to Vancouver, Wash. Stretching across rough foothills flanking the river's course, it is one link in Bonneville Power Administration's network of lines serving the Pacific Northwest.

The 37-mile long line serves as a feeder between Bonneville Power House and J. D. Ross Substation. One circuit of the line is tied directly to an aluminum plant in Troutdale.

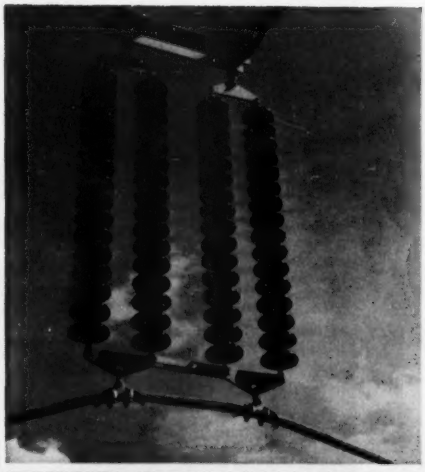
This line — like so many of America's major transmission lines — is equipped with BTC Hi-Line Hardware. Specify BTC Drop Forged Clamps and Fittings for your own transmission line projects. You'll find they are easier to install — give efficient, trouble-free performance — and hold maintenance to a minimum.



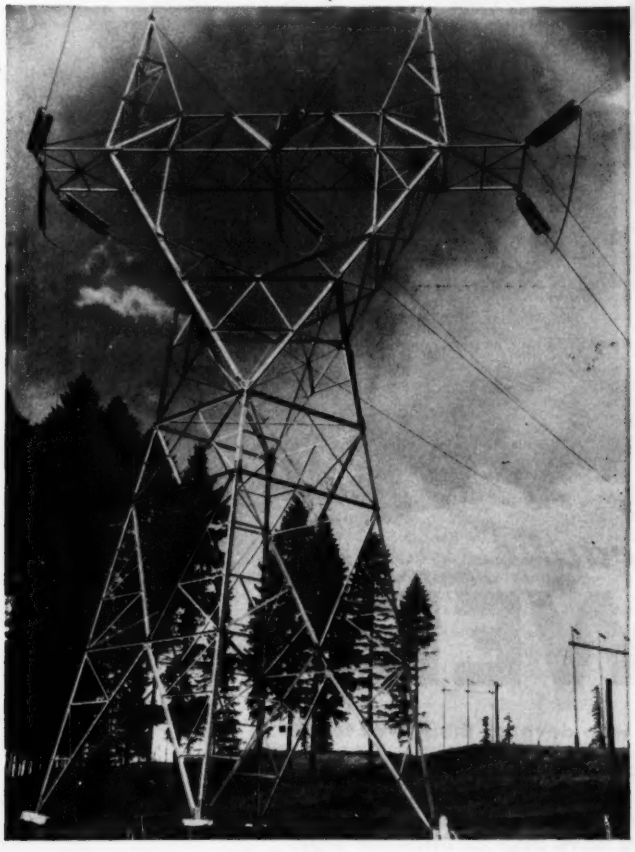
LONG WAY UP Bonneville Power Administration linemen install BTC Six-String Strain Yoke Sets on a Bradford Island Crossing Tower on the Columbia River. Note BTC Triple Strain Yoke Sets already in position.

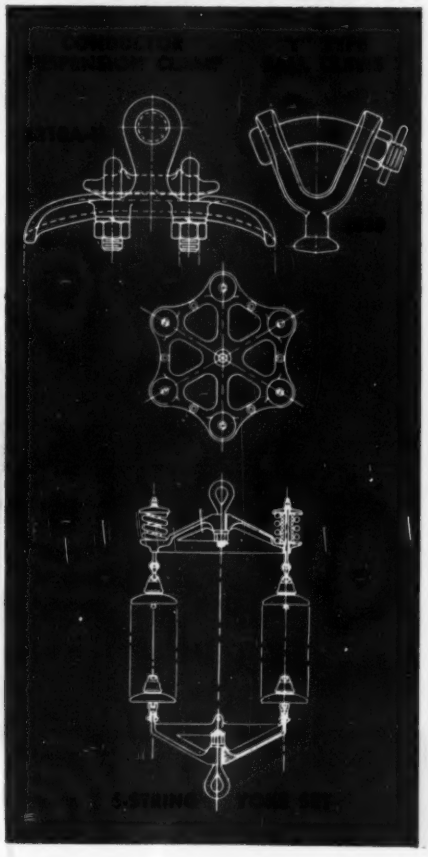
for the Pacific Northwest

BIRD'S EYE VIEW Two BTC Double Strain Yoke Sets with suspension clamps and stabilizer bar are installed on a Bradford Island Crossing Tower high above the Columbia River.



TYPICAL TOWER This single circuit angle dead-end tower is typical of those found along the 37-mile stretch between Bonneville and Vancouver. BTC Triple Strain Yoke Sets are used.





Sold Through Your Insulator Manufacturer Only

Drop Forged BTC Hi-Line Hardware

The BREWER-TITCHENER Corporation

Cortland • New York

PIONEERING
in Hydraulic
POWER –

The Pioneers - those who devoted their lives to the harnessing of one of nature's mightiest forces - water - contributed greatly to this nation's progress! For 75 years, we have built turbines for high, medium and low heads, many types of valves, hoists and gates, pumps, trash rack rakes and kindred hydraulic equipment. Put your problem up to us.

S. MORGAN SMITH Co.
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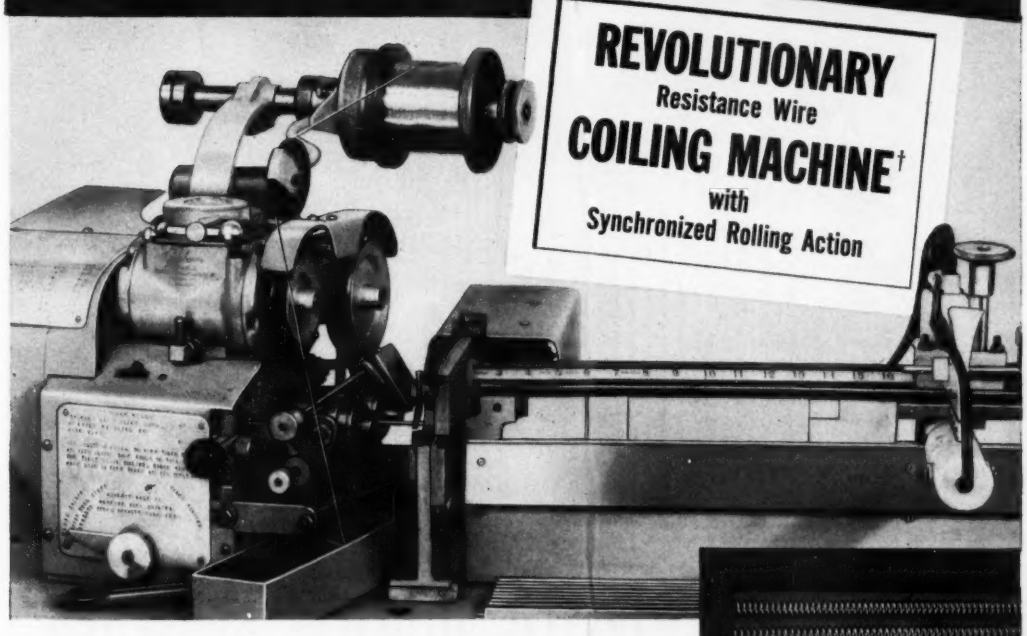
DRIVER-HARRIS ANNOUNCES . . .



REVOLUTIONARY
Resistance Wire
COILING MACHINE†
with
Synchronized Rolling Action

As producers of the world famous "Nichrome"* and other outstanding electric heating and resistance alloys, Driver-Harris engineers are interested in obtaining application results commensurate with the exceptional advantages their alloys afford. Therefore they have developed a new coiling machine which eliminates wire coiling faults—especially coil irregularity due to work-hardened areas produced during coil formation.

This new machine is the result of knowledge accumulated during forty years of close association with wire coiling problems. Its revolutionary principle of operation—*the synchronized rolling action of all coiling parts*—results in vastly improved performance over that of any other type machine.

Product of long study and a thorough knowledge of the requirements of the industry, this Driver-Harris unit—

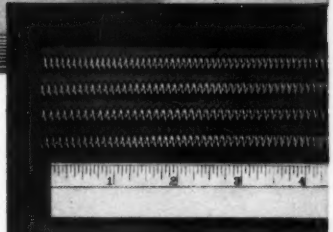
(1) handles the full range of resistance wire coiling normally required, close or open winding (and can be adapted for twin wire coiling);

(2) cuts coil ends clean on all sizes, close or open wound;

(3) maintains resistance accuracy of cut coils at all times by photo-electric control (variation not exceeding ± 1%);

(4) affords the lowest operational and maintenance costs of any comparable coiling machine.

Standard Model coils #20 to #36 B&S gauge wire. Units for other gauges built to order. Send for illustrated Bulletin C-52, giving full information.



Note even spacing between turns of stretched coils.

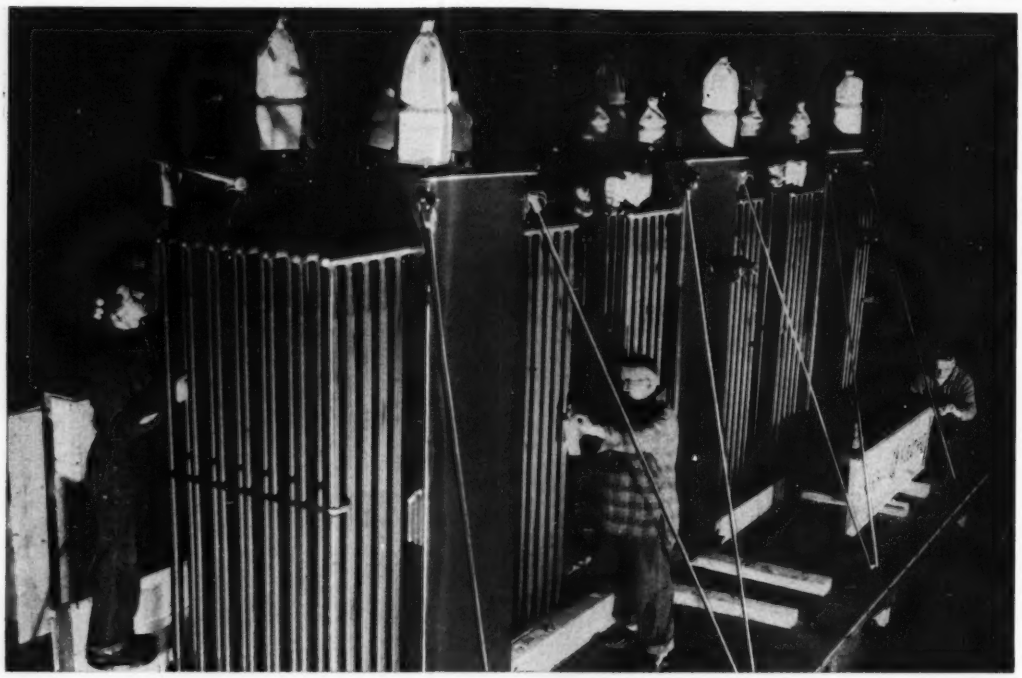
Coil ends lie *flat*. No burring or twisting of wire.

*T.M. Reg. U.S. Pat. Off.
†Patent Pending

Driver-Harris Company
HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD



89 Different Electric Utilities Specified RM* Transformers in 1951...gain of 15.6% over 1950

RM designs now conform to new ASA Standards... faster shipments, lower prices are retained

Our records for 1951 show that 89 different electric utilities capitalized on the shorter shipments at lower prices obtained by specifying General Electric's RM power transformers. This represents an increase of 15.6% over the 77 utilities that placed RM orders in 1950.

In terms of actual volume, RM units accounted for 59.2% of all orders for power transformers in the RM range—convincing evidence of their wide acceptance, and of the flexibility in application they offer.

This year we anticipate even wider acceptance of RM transformers which now conform to the new Proposed Standards for Transformers, recently adopted by the users and manufacturers represented on the ASA C-57 Committee. These new RM ASA transformers offer the same price and delivery advantages as previous RM designs.

For complete information on the new ASA Standards, and on RM ASA transformers, see your local G-E representative. Or write to *General Electric Company, Schenectady 5, New York.*

*RM stands for "Repetitive Manufacture." By using standardized construction methods, General Electric builds RM power transformers more economically—delivers them faster. RM designs are available in ratings 10,000 kva and below and up to 69 kv, with many optional features.

401-29

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

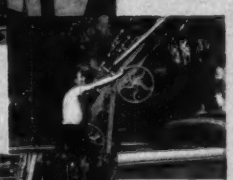
THIRTY FEET HIGH in THIRTY SECONDS

Simple, Easy, One-Man Operation

1. Ladder hold-down on cab roof is released.

2. Pressure is applied to lower ladder rung.

3. Ladder is locked in elevated position.



4. Upper section is extended to desired height.

5. Ladder is rotated to spotting position.

6. Incline of ladder is adjusted as required.

POWERS *American* SERIES 5510

REVOLVING AERIAL LADDER

Sounds unbelievable . . . but the *Powers-American* Aerial Ladder is so simple, so fast, and so easy to operate that it can be raised to a working position in only 30 seconds—by *one man!* This versatile ladder can be spotted in 40 positions throughout a 360° revolution . . . inclined to any angle from 30 to 75 degrees. Its curved platform falls into position automatically—to provide a level working surface. What's more, this ladder is so safe that it will support *five* times the normal working load. If your operation calls for overhead work, get all the facts on *Powers-American* Aerial Ladders. Mail the coupon NOW for complete information.

POWERS *American* DIVISION

PUBLIC UTILITY BODIES AND EQUIPMENT
McCABE-POWERS AUTO BODY COMPANY
HOME OFFICE: 5900 N. Broadway, St. Louis 15, Mo.
WESTERN OFFICE: Latham Square Building, Oakland 12, Calif.

CLIP THIS COUPON AND ATTACH TO YOUR LETTERHEAD

McCABE-POWERS AUTO BODY COMPANY • 5900 N. Broadway • St. Louis 15, Mo.

Please send me details on the following:

SERIES 5510 REVOLVING AERIAL LADDER ( ) 25' 6" ( ) 35' 6" ( ) 30' 6"

☐ Line Construction Bodies	☐ Wire Reels	☐ _____
☐ General Service Bodies	☐ Pole Trailers	☐ _____
☐ Light Duty Maintenance Bodies	☐ Hydraulic Towers	☐ _____

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

miller luminaires

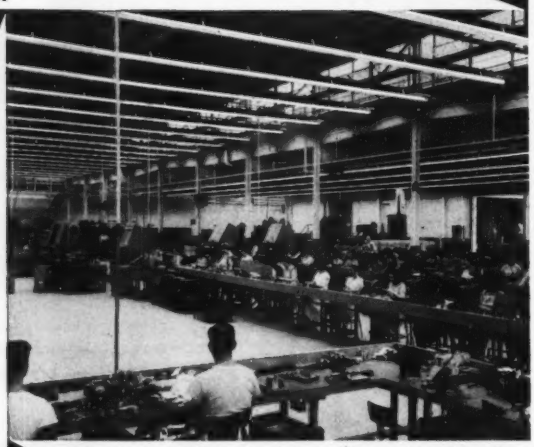
—the soundest investment of lighting dollars

Miller 50 Foot Candler For Slimline Lamps

miller
leaders in lighting
since 1844

factories
offices
schools
stores
public buildings

The advantages Miller Luminaires offer are many—first they are built to provide good light for easy seeing, for best work and avoidance of errors and accidents...Easy installation ...Low maintenance...Long, trouble-free service. For 108 years Miller has pioneered in GOOD LIGHTING with a complete line of luminaires—Fluorescent, Incandescent and Mercury for industrial and commercial lighting requirements. They have been proven in thousands of installations. Light with confidence the proven Miller way. Don't compromise on lighting that is "almost" right. When you buy, or specify, Miller luminaires, you are sure of getting all you seek—lighting equipment built on an exacting 8-Point QUALITY standard—the product of advance illumination engineering—the soundest investment of your lighting dollars. Miller field engineers and distributors are conveniently located for nation-wide service.



Interior shown is Greist Manufacturing Company, New Haven, Conn.
Architect; Leo Caproni
Consulting Engineers; Hubbard, Lawless and Blakely
Electrical Contractor; Otto H. Schulz

THE miller COMPANY MERIDEN, CONN.
SINCE 1844

ILLUMINATING DIVISION Fluorescent, Incandescent, Mercury Lighting Equipment
HEATING PRODUCTS DIVISION Domestic Oil Burners and Liquid Fuel Devices
ROLLING MILL DIVISION Phosphor Bronze and Brass in Strips and Rolls

VICTOR DISTRIBUTION INSULATORS

NOW EVEN BETTER WITH PURIFIED PORCELAIN!

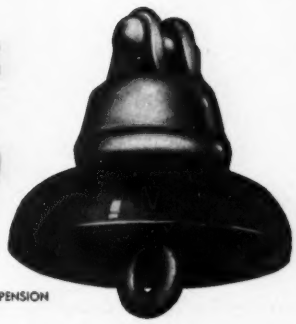
NO. 504
GUY STRAIN

NO. 5 LOW-VOLTAGE
PINTYPE

Spools, guy strains, pintypes, suspensions—all are made of the same new *PURIFIED* PORCELAIN as VICTOR's high voltage transmission types. This means that every VICTOR insulator is a better insulator —with highest insulation values, unequalled density, rock-like strength, hardness and resistance to impact, and a product uniformity never before achieved!

Through years of research, VICTOR has eliminated the last big variable in porcelain-making by removing all mineral salts from water used in processing. Results are reduced fluctuations in shrinkage and density and virtual elimination of microscopic, glass-like impurities which, up to now, have prevented maximum insulator strength and hardness. Remember—VICTOR *PURIFIED* PORCELAIN is the finest insulator porcelain ever made!

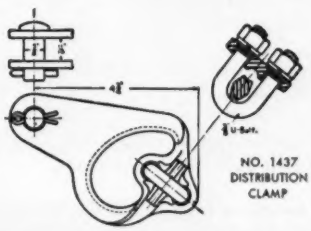
NO. 2012 SPOOL



NO. 804 SUSPENSION

VICTOR INSULATORS, INC.
VICTOR, N. Y.

VICTOR INSULATORS



NO. 1437
DISTRIBUTION
CLAMP

DISTRIBUTION LINE HARDWARE

VICTOR carries a complete line of distribution clamps in all required types and materials to accommodate cable sizes from 0.145 to 0.60 inches. Snubbing, quadrant or boltless types in forged steel, malleable iron or pressed steel with or without aluminum liners, according to type and size of cable to be accommodated.

"Our Country's Strength is Created . . ."

REESE H. TAYLOR
President, Union Oil Company of California

"Our country's strength is created by the responsibility and solidarity of individual citizens in a self-chosen government and economy. It can—and must—be perpetuated against all who seek to undermine it. The men and women who invest regularly in United States Defense Bonds are contributing to our national integrity and to the traditions of personal independence so characteristic of a free people."

Every pay day, 6,500,000 employed men and women . . . "are contributing to our national integrity and to the tradition of personal independence . . ." by the systematic purchase of United States Defense Bonds.

How important is this contribution to national economy and personal security? Let's look at a few figures.

- the cumulative purchases of 6,500,000 Payroll Savers add up to $130,000,000 per month.
- the number of individual E Bonds sold in 1951 totaled 68,069,000 pieces—8% more than in 1950.
- purchases of $25 and $50 E Bonds—the denominations popular with Payroll Savers—were greater than the sales of $500 and $1,000 E Bonds.
- monthly redemptions of unmatured E Bonds during each of 9 months (April to December, 1951) were less than 1% of the amounts outstanding.
- the *cash value* of Series E Bonds held by individuals on December 31, 1951, amounted to $34,727,000,000—$4.8 billions more than the cash value of Series E's outstanding in August, 1945.

That Americans have built personal security and a reservoir of purchasing power exceeding $34.7 billions is due in no small measure to the patriotism and foresight of men like Mr. Taylor and other leaders of industry who have made the Payroll Savings Plan available to their employees.

For help with your Payroll Savings Plan, phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D. C.

The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

ELECTRICAL WEST

Pole in splinters ... service intact!

On Loretto Heights Hill, near Englewood, on the Colorado Central Power Company system, this Westinghouse "CSP®" Distribution Transformer took a direct stroke of lightning early in the evening, yet maintained service with no interruption throughout the night!

The following day, when a new pole was installed, the transformer was found to be completely unharmed, although the ground lead from the tank discharge gap was burned off. The unit was therefore again hooked up for service.

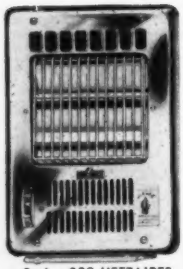
Westinghouse "CSP" (Completely Self-Protecting) Transformers, because *all* parts are factory co-ordinated, provide better protection against lightning, surges, short circuits, and overloads, giving assurance of service continuity. Your Westinghouse Representative will be glad to show you actual figures which explain why Westinghouse "CSP" Transformers offer bigger savings in installation and maintenance costs. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70616-A

"CSP" devices . . . originated and patented by Westinghouse

YOU CAN BE SURE... IF IT'S Westinghouse

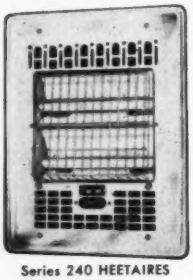
"CSP" DISTRIBUTION TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

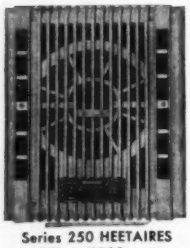


Series 230 HEETAIRES
1250 to 3000 watts

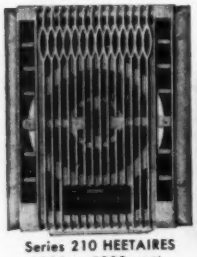
Series 200 HEETAIRES
1000 to 2000 watts



Series 240 HEETAIRES
1000 to 1500 watts



Series 250 HEETAIRES
1500 to 3000 watts



Series 210 HEETAIRES
3000 to 5000 watts

Here's how you can fill every auxiliary heating need of every BUILDER, CONTRACTOR, and HOME OWNER!

HEETAIRES . . . are manufactured in a complete range of types and sizes for every purpose . . .

HEETAIRES . . . range in wattage from 1,000 to 5,000 (120 and 240 volts), produce from 3,402 to 20,472 BTU's per hour — for light, intermediate and heavy duty.

ALL HEETAIRES are available with AUTOMATIC THERMOSTATIC HEAT CONTROLS

All HEETAIRES can produce and maintain any desired temperature between 40° and 80° F. (with only a 2° differential at all times). This insures correct healthful comfort—uninterrupedly—quickly, wherever wanted.

HEETAIRES are available in wall inserts and wall attachables — both with either built-in or external thermostatic controls.

HEETAIRES are available in three heat types — radiant heat, heated air, fan-forced radiant heat.

FAN-GLO HEETAIRES — Series 230 produce both kinds of heat — infra-red rays plus fan-forced heated air.

HEETAIRES Series 200 and Series 240 produce infra-red rays (radiant heat).

HEETAIRES Series 250, Series 210, produce fan-forced heated air.

Tested and listed under reexamination service by Underwriters' Laboratories, Inc. Thermostatic or Manual Control . . . Radiant Heat, Heated Air and Fan-Forced Radiant Heat . . . Wall Inserts and Wall Attachables.

FREE! Write for the copyrighted "A GUIDE TO QUICK HEATING"

MARKEL ELECTRIC PRODUCTS, INC.
LA SALLE PRODUCTS, INC.

148 Seneca Street, Buffalo 3, N. Y.

LETTERS TO THE EDITOR

To the Editor:

It was very interesting to read your Sales Guide News Letter of April 1952 wherein you published a lot of information about the new food and freezer plans currently the rage in California as well as other parts of the country.

Of particular interest to us was your second paragraph wherein you state as follows: "Seems to have started in Los Angeles and New York." Certainly not by way of criticism but just to keep the records straight, we would like to advice you that it is our honest belief that we of the Better Living Co. are the originators of the food and freezer plan. Our Better Living Co. was started for the specific purpose of selling food and freezers on Dec. 19, 1949, in the city of Sacramento, Calif. By April of 1950 we had our second branch in Fresno and today we have 10 branches in northern California. Our information is that the second entry into the field was the Rich Plan who incorporated sometime in June of 1950.

You certainly are correct when you say "everyone is trying to get into the act." It is our sincere hope and belief that the food and freezer business is here to stay, provided that it resolves itself into a dignified business by all concerned.

The date that we refer to above wherein we lay claim to the originator of the food and freezer plan is a matter of record and we will be glad to substantiate this if you desire. Keep up the good work as your News Letters are always very interesting and informative.

T. F. Rhoy
President
Better Living Co.
Oakland, Calif.

To the Editor:

I was very much gratified to receive your letter explaining that you do not back-date any subscriptions. Naturally, that is your privilege. Even more so, I was pleased that I would receive the last three issues of 1951 and without cost too! . . .

I was particularly interested in the October '51 issue concerning the Contra Costa steam plant of PG and E because of the centralized control feature. At the present time the Southern California Edison Co. is building the Etiwanda plant that is designed for central control . . .

In the November issue the article, "Planned Distribution for a Planned City," was right nice since I watched that city rise from a mass of barley fields. The "Gadsby Steam Plant" was interesting too.

The December issue was right there also, what with R. G. Kenyon's article on the employees of Southern California Edison.

Now you see why I was very much interested in obtaining these issues.

Your kindness and promptness in fixing me up with these issues is gratifying indeed. Thank you once again.

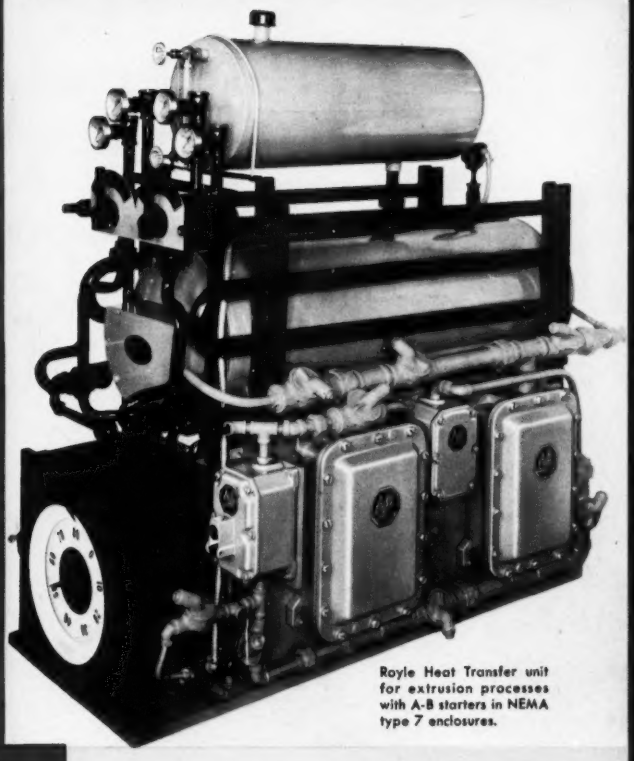
Arthur R. Bundy
Turbine Room Foreman
Southern California Edison Co.

Where
BOLTED ENCLOSURES
are a MUST...

Specify

A-B Quality

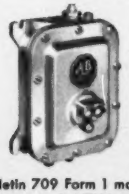
TROUBLE FREE
STARTERS



Royle Heat Transfer unit for extrusion processes with A-B starters in NEMA type 7 enclosures.

NO CONTACT MAINTENANCE

Bulletin 609 manual starter in NEMA type 7 enclosure for hazardous gas locations.



Bulletin 709 Form 1 magnetic starter in NEMA type 7 enclosure for hazardous gas locations.

Freedom from contact maintenance is, of course, desirable in any motor starter . . . but especially so for controls in safety enclosures with bolted covers.

It is never easy to unbolt and replace heavy cast iron covers for routine inspections. That is why electricians and plant engineers specify Allen-Bradley trouble free motor controls. They know from experience that Allen-Bradley switches with double break, silver alloy contacts will operate for months . . . and even years . . . without requiring even contact inspection. They know also that the simplicity of Allen-Bradley starters means freedom from trouble . . . hence, freedom from production stoppages.

When you have a location requiring bolted safety enclosures, do away with maintenance trouble by specifying Allen-Bradley trouble free controls. When you have an especially tough job, always use A-B controls. Why not send for the Allen-Bradley Handy Catalog and have full information at your finger tips?

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

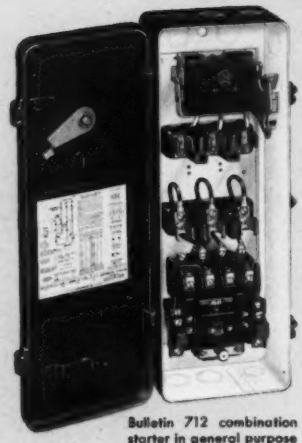
Bulletin 709 magnetic starter with cover removed. Enclosure is NEMA type 4 for watertight operation.

ALLEN-BRADLEY

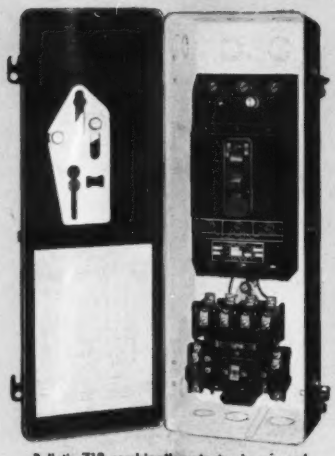
MANUAL AND AUTOMATIC STARTERS

QUALITY

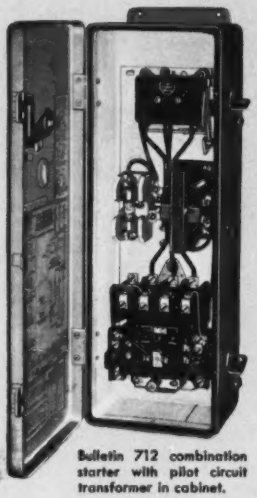
3-52-M



Bulletin 712 combination starter in general purpose enclosure with fuse clips.



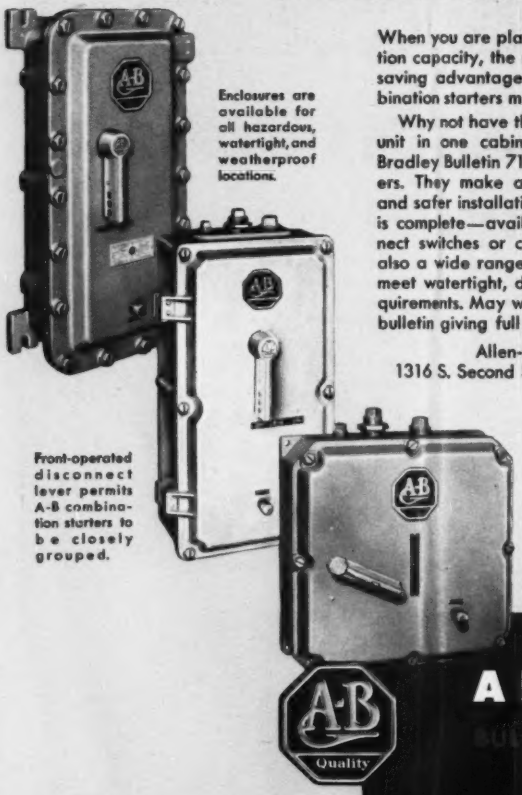
Bulletin 713 combination starter in general purpose enclosure equipped with ITE circuit breaker instead of fused disconnect switch.



Bulletin 712 combination starter with pilot circuit transformer in cabinet.

A GREAT LINE • A COMPLETE LINE

of Combination Starters



Enclosures are available for all hazardous, watertight, and weatherproof locations.

Front-operated disconnect lever permits A-B combination starters to be closely grouped.

When you are planning additional production capacity, the space-saving and labor-saving advantages of Allen-Bradley combination starters merit serious consideration.

Why not have the starter and disconnect unit in one cabinet? Just specify Allen-Bradley Bulletin 712-713 combination starters. They make a neater, more compact, and safer installation. Bulletin 712-713 line is complete—available either with disconnect switches or circuit breakers. There is also a wide range of special enclosures to meet watertight, dust-tight, or gastight requirements. May we send you a descriptive bulletin giving full details and prices?

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

Bulletin 712 combination starter in dust-tight enclosure.

Allen-Bradley starters in safety enclosures require no contact maintenance—a great convenience with bolted enclosures.

The disconnect lever can be padlocked up to 3 locks to prevent accidental switching during machine maintenance.

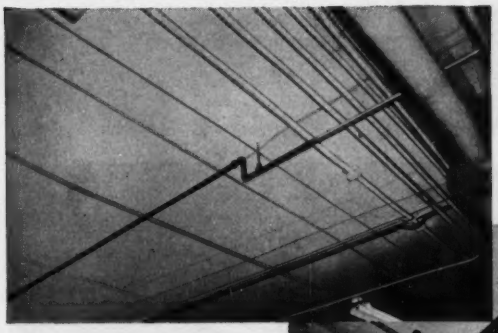
A-B Quality

ALLEN-BRADLEY

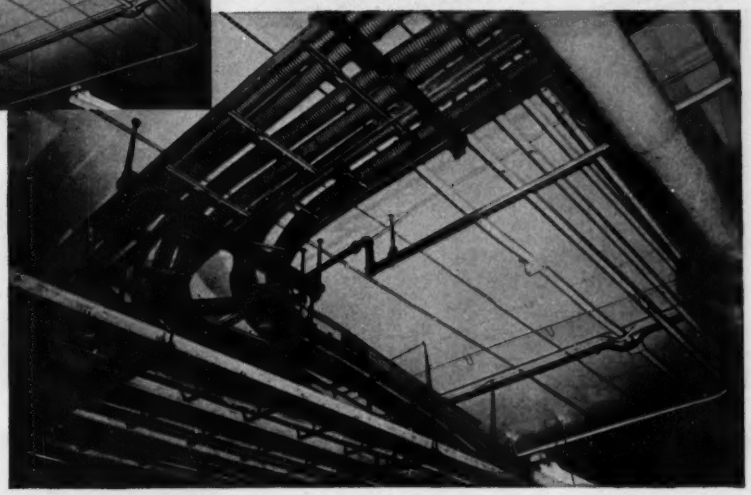
BULLETIN 712-713 COMBINATION STARTERS

QUALITY

3-52-M



GETTING DISTRIBUTION IN FAST was the big problem in the conversion of a Midwest warehouse to a defense plant. Here the ceiling was available for wiring, but a decision had to be made on the type of wiring that would go in fast and offer the most practical results.

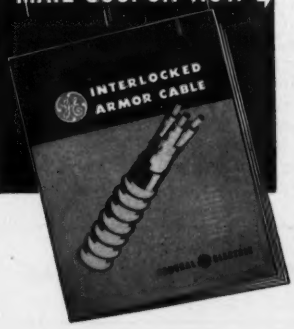


IN RECORD TIME this neat, efficient installation of G-E interlocked armor cable went into place. No detailed layout was necessary . . . cable was simply laid up on racks without need for extra protection.

Get the Facts on Installation Speed from this NEW G-E Interlocked Armor Cable Catalog

This new 20-page catalog tells you the important time-saving, cost-saving advantages of the G-E interlocked armor cable system. It offers new ideas in installation speed, explains the important benefits you get when you put up raceway and cable at the same time. Send for your copy today.

MAIL COUPON NOW



Section W13-525, Construction Materials Division,
General Electric Company, Bridgeport 2, Connecticut

Please send me your new, free catalog, "G-E Interlocked Armor Cable," Pub. No. 19-211.

Name_____ Title_____

Company_____

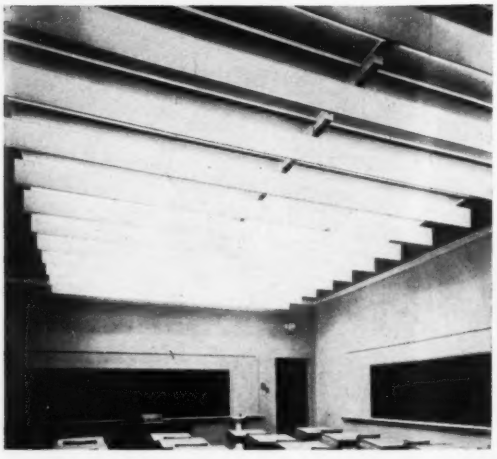
Address_____

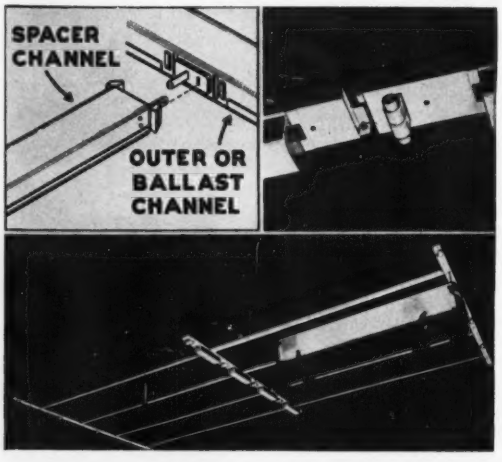
City_____ Zone____ State_____

You can put your confidence in—

GENERAL ELECTRIC

PRODUCT NEWS





Lighting System

(1) Benjamin Electric Mfg. Co., Des Plaines, Ill.

A grid-like arrangement of prewired channels, single-pin T12 Slimline lamps and translucent shields makes up a new Grid-Lite system. The plastic shields are suspended between each row of lamps to reduce brightness and give seeing comfort. According to the manufacturer, the system is an unobtrusive ceiling of light providing more usable illumination without annoying glare.

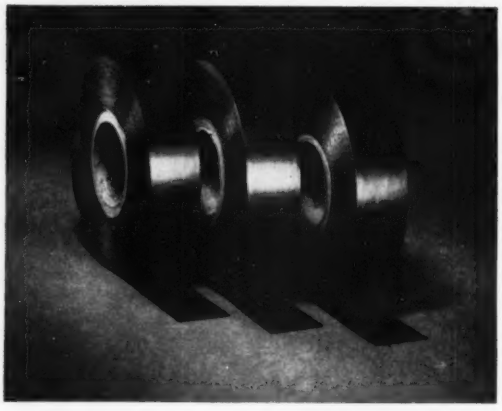
A new-type built-in coupling device couples channels and a minimum of wiring is required by the installer. Because there are few horizontal surface areas where dust can collect, little cleaning is required to sustain original lighting levels, according to the manufacturer.

Grid-Lite can be ordered in a variety of subassembly, unit-package sections and combinations can be laid out to fit rooms of many sizes and shapes, it is stated. For rooms of approximately 16x24 ft and somewhat larger, a complete system can be ordered under one catalog number.

All-Purpose Insulating Varnish

(2) General Electric Co., Chemical Division, Pittsfield, Mass.

A newly developed insulating varnish is suggested for a variety of electric equipment. According to the manufacturer, it is suitable for treating motor and generator cores and windings, magnet coils and transformer windings; can be used on rotors with speeds up to 10,000 rpm. An oil-modified phenolic type, this 9700 varnish is claimed to cure thoroughly in deep sections giving high bonding strength with a smooth wrinkle- and bubble-free surface. It may be applied by dipping, roller coating, brushing or spraying, and vacuum or pressure impregnation may be used. It contains 49-51% solids and can be thinned with petroleum spirits.



Plastic Tape

(3) Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington 11, N. J.

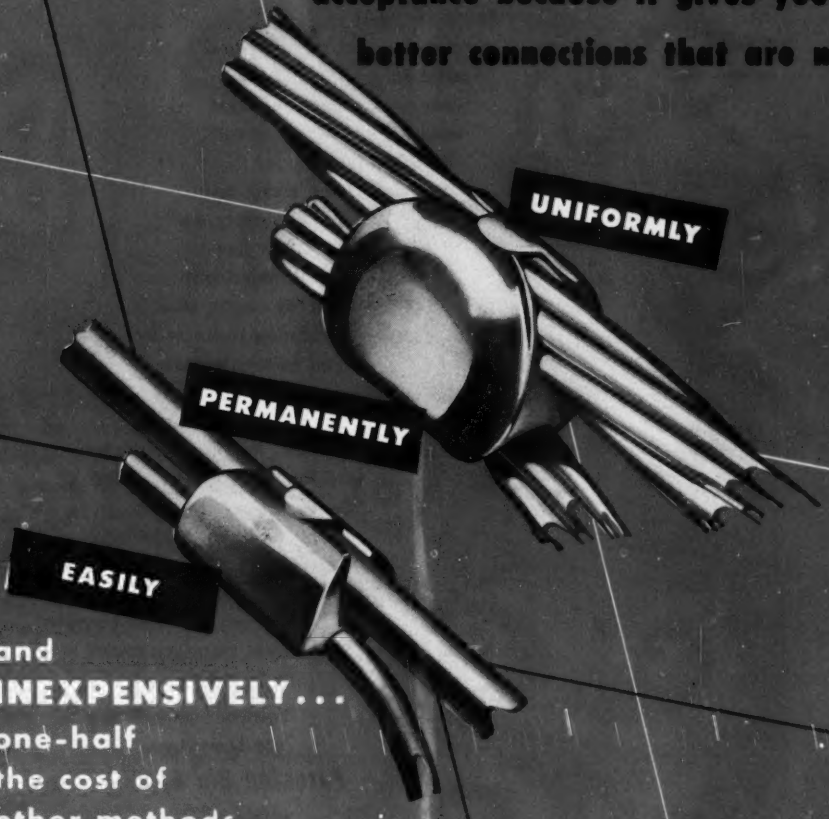
A calendered tape, said to have excellent chemical resistance and dielectric strength, is based on the same formulation as the manufacturer's Temflex 105 tubing; is called Temflex 105 tape. Superior oil resistance fits it for use in transformers or in diesel equipment. High tensile strength makes its use on taping machines more effective, the manufacturer states, and, although it is not easily stretched, it possesses good ultimate elongation.

For More Data Fill in Coupon on Page 60

THE NEW KEARNEY SQUEEZON

(cold welder connector)

has received enthusiastic industry-wide acceptance because it gives you better connections that are made



and
INEXPENSIVELY...
one-half
the cost of
other methods

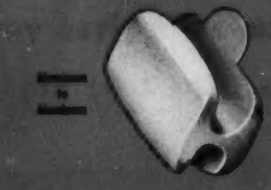
JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

See following pages for more detailed information

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

SQUEEZONS

give you a perfect electrical bond



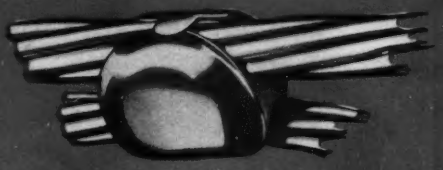
There are two types of Squeezons—solid copper and plated solid copper. Both types are available in sizes ranging from 4/0 through 8 solid. Solid copper Squeezons are corrosion inhibited at the factory and handle all copper line to copper tap combinations. The plated Squeezon, also made oxidation resistant by a special factory process, will handle all combinations of copper, Copperweld, aluminum, ACSR, Amerductor and Ruralductor. The plated Squeezon prevents the combination of dissimilar metals from giving rise to galvanic action, and at the same time, provides excellent current transfer surface in the connector.

You can't go wrong when you use Squeezons.

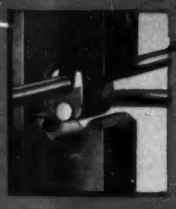
Patented Bin Box

Squeezons are shipped in the patented bin box for easy storing and more efficient handling on the truck.

West Coast Distributors: MAYDWELL and HARTZELL, Inc.



for connections of every conductor combination

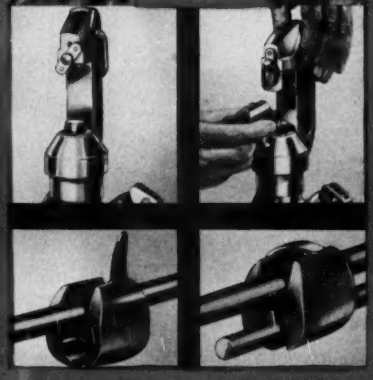


LINE CREWS APPRECIATE THIS SIMPLE EASY METHOD OF MAKING LINE CONNECTIONS

A Click and it's Done !

The KEARNEY SQUEEZON is a pure copper compression-type connector forged in a shape having an "H" cross-section. The connection is made by placing one conductor in the top half of the "H" and the other in the bottom. The sides are then coined over under tremendous hydraulic pressure—applied by pumping one handle of the SQUEEZON Tool. When the second distinct click is heard the connection is then complete, permanent and a perfect electrical bond.

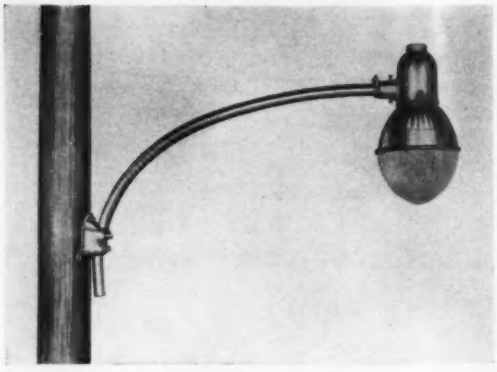
WRITE TODAY for big, 8-page bulletin on the Squeezon.



JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

KEARNEY *Gives a Little More for a Little Less through Engineering*



Adjustable Bracket

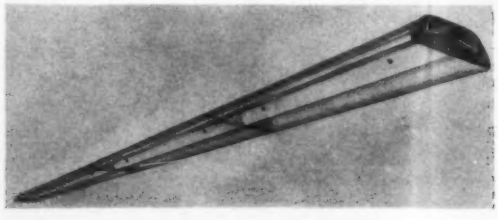
(4) Line Material Co. (a McGraw Electric Co. Division), Milwaukee 1, Wis.

A new single-curve upsweep bracket featuring integral plumbing for wide ranges of pole rake is available in steel or aluminum construction with all conventional types of end fittings.

Contour and the simple, single-piece pipe construction make the bracket easy to wire, the manufacturer states. There are no sharp bends or extra parts through which the wiring must be guided. A minimum of pole space is required for mounting.

The prewired bracket assembly is attached to the pole by means of an open-slotted pole plate that is slid over a single through-bolt at the top. The entire weight of the assembly is supported in this manner, while the two lag screws are installed.

Two U-bolts, which are an integral part of the pole plate, clamp the pipe in the proper position. They allow for quick, easy adjustment when compensation for pole rake is necessary.



Industrial Unit

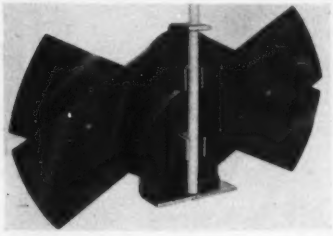
(5) Smithcraft Lighting Division, Chelsea 50, Mass.

The new A.L.S. industrial unit is an improved fixture with 22.5% uplighting to cut the sharp contrast between bright areas below the lamps and dark areas above. To further reduce glare 30° shielding is provided. Close interlocking of lampholders is claimed to make possible long lines of continuous light with no dark areas between. Maximum airflow through the fixture minimizes turbulance and permits circulation of air so that lamps stay clean longer, the manufacturer states. Reflectors shield the lamps completely, protecting them from dust. The new unit comes in 4-, 6-, and 8-ft Slimline. Baffles are available to give additional lengthwise shielding.

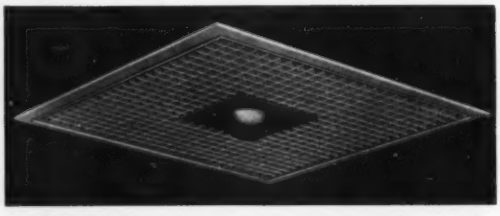
Pole Key Anchor

(6) A. B. Chance Co., Centralia, Mo.

This newly designed anchor for keying poles at the base where guys are impractical can be used also just below the ground level on the strain side to take the place of wooden planks or logs that are sometimes used for the top key. This device is dropped into the hole beside a newly installed pole with the anchor rod attached. When it is in position at the bottom of the pole, it is expanded by tamping on its top plate in same way that an expanding anchor is opened. This forces the blades out into the solid earth, making a highly efficient pole key that is cheaper and easier to install at the base of the pole than log or plank keys, the manufacturer states. The anchor rod is then removed.



The pole's key is often used on street lighting or telephone circuits dead ended in residential districts where guys would be undesirable or impossible to install, the manufacturer points out.



Lighting System

(7) Smoot-Holman Co., Inglewood, Calif.

The Skylike, a modular incandescent lighting system, was designed for built-in modern architectural use. Individual units employ lamps with silvered or semisilvered bowls allowing variable light control from a widespread to a more concentrated distribution by an interchange of bulbs. Accessories permit use of lamps ranging from 150 to 500 w for variable lumen output of 2,500 to 10,000 lumens. The system may be relamped from the floor with a pole-type lamp changer. Because the system produces a warm color, it is recommended by the manufacturer for commercial installations where clothing, home furnishings, cosmetics, foods, etc., are displayed.

Volt-Ammeter

(8) Pyramid Instrument Corp., Lynbrook, N. Y.

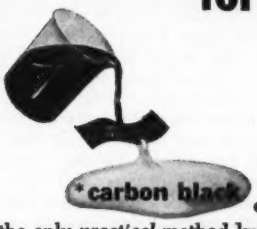
Amprobe model 1200 measures up to 1,200 amp, can be carried in the coat pocket. It is of the snap-around type that measures current instantly without being connected to the conductor. It uses a newly developed doughnut-type transformer claimed to eliminate for all practical purposes the factor of error from position of conductor within the probe jaws; incorporates six ammeter ranges and three voltmeter ranges.

type

CB*

construction

for longer power cable life



construction (type CB) is the only *practical* method known for purifying and stabilizing the oil impregnate in power cable.

Type CB cables can be made with a resilient carbon black paper binder. This is a big improvement because it combines great strength with resiliency. The lead sheath is thereby relieved of strains due to bending and temperature rise.

And you can get CB with F-3** Arsenic-Lead Alloy Sheath. It does not age-harden and has the highest resistance to slow-bending fatigue, creep, vibration and internal pressure.

So it's Type CB with resilient binder and F-3 for power cable that lasts.

For technical details, ask your nearest Anaconda Sales Office, or write to Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 5208

the right cable for the job

ANACONDA® wire and cable

*CB—Carbon Black (U. S. Patent 2,102,129) Reg. U. S. Pat. Off. **F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755 and 2,504,600) Reg. U. S. Pat. Off.

THE MARK OF

MARCUS MTC

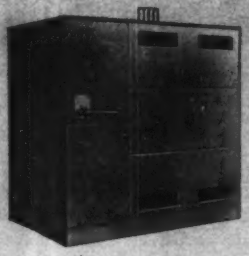
QUALITY

formula for this latter remains unchanged. The combination of a good product with genuine interest in the customers' side of the transaction has necessitated the completion of our third and largest expansion move within the past 5 years. What better recognition of the *"Mark of Quality"!*

•

Representatives in Principal Cities

General purpose transformers, 600 volts and below; 1-15 KVA inclusive, single or three phase.



450 KVA, Type F Unit Substation, 4160 V. Delta, 60 Cycles, 3 Ø—120/208Y, 4 wire.

PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS

MARCUS DRY TYPE transformers

NEMA

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY.

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

• DISTRIBUTION • GENERAL PURPOSE • UNIT SUBSTATION • PHASE CHANGING • ELECTRIC FURNACE • WELDING • MOTOR STARTING • SPECIAL

MARCUS TRANSFORMER CO., Inc.

(9) **Micamat, a new form of electric insulation, is being produced by General Electric Co., Chemical Division, Pittsfield, Mass. Utilization of domestic sources of mica may free United States industry from dependence on foreign sources, it is claimed. The G-E product is in a continuous sheet in thicknesses ranging from two-thousandths to six-thousandths of an inch and is said to have improved properties. It emerges here from a machine where minute mica flakes are so treated that the force generated holds the tiny particles together**

One Knob Control for Air Conditioner

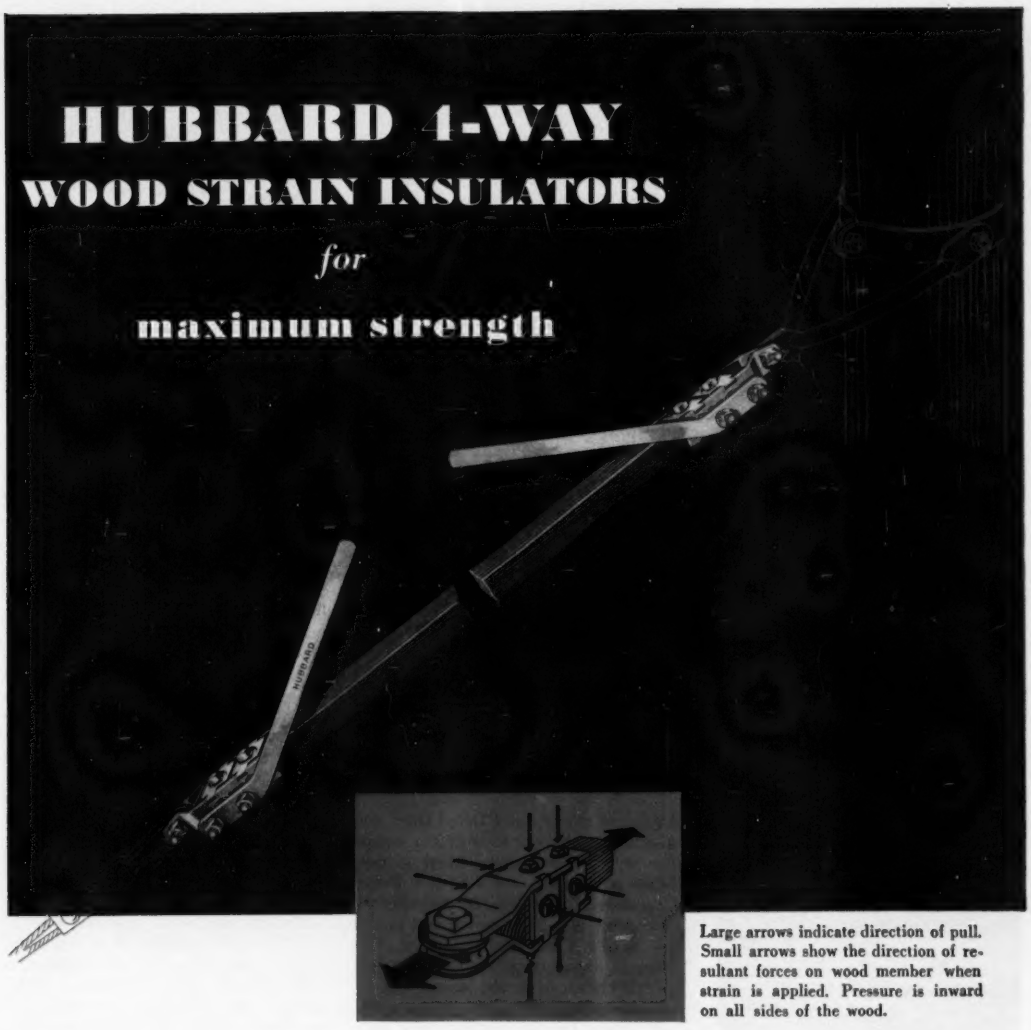
(10) Mitchell Mfg. Co., 2525 Clybourn Ave., Chicago, Ill.

New ½-, ¾- and 1-hp window-type air conditioners feature choice of interior climate at the twist of a motor control knob. Known as the Weath'r Dial, the device has six knob positions: Dyna Cool, maximum; Nite Cool, half-speed cooling; Arid Dryer for extra dehumidification; Exhaust, room clearing at the rate of 200 cu ft of air per minute; Ventilate, fresh air without extra cooling; Off. The dial and air control are concealed beneath a metal cover at the top of the furniture steel cabinet. Another feature is a sound muffler, which directs air against a sound-absorbent material said to deflect it to the room while absorbing sound waves.

(11) **PIPE AND TUBE CUTOFF**—A machine that will cut as many as 60 pieces of 12-in. pipe and tube per hour has been announced by Continental Machine Co., 1952 N. Maud Ave., Chicago 14, Ill.

(12) **INSULATING COMPOUND**—Chester Cable Corp., 521 Fifth Ave., Chester, N. Y., has developed an insulating compound for operating temperatures of −60 C to +120 C. It is designated HLT 500.

HUBBARD 4-WAY
WOOD STRAIN INSULATORS
for
maximum strength



Large arrows indicate direction of pull. Small arrows show the direction of resultant forces on wood member when strain is applied. Pressure is inward on all sides of the wood.

WHEN TENSION is applied to the Hubbard Wood Strain Insulator, the interlocking plates move forward simultaneously, and the inclined planes under the heads and nuts of the assembly bolts move uniformly inward, exerting a pressure in a direction 90-degrees to the line of pull on all four sides of the wood member. The design takes advantage of a higher percentage of the fibre strength of the wood than any other type of wood strain insulator.

The end plates almost completely enclose the wood, preventing end-checking over long periods of service. The wood member and the mechanical attachments of the fittings to the wood are the strongest parts of the strain insulator. When pulled to destruction, failure occurs at the clevis end of the attachment strap. This is desirable, as the strength of these straps is fairly constant and can be predetermined, whereas wood, and attachments to wood are variable as to strength properties, especially over long periods of exposure.

H HUBBARD AND COMPANY
ESTABLISHED 1843
PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA
"Hang the load on Hubbard Hardware!"

KLEIN

Quality you can count on—FOR SAFETY... FOR SERVICE

Yes, safety and service are the two big reasons why Kleins are the choice of the man on the pole. Look for the familiar Klein trade-mark on pliers and climbers, safety straps and belts, lag wrenches and grips. It has been a trade-mark of quality "Since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide today!

"Since 1857"

Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.

3200 BELMONT AVE CHICAGO 18 ILL

Cable

(13) Bailey Meter Co., 1022 Ivanhoe Road, Cleveland 10, Ohio

Armortube cable, a flexible, protected multitube transmission line, is designed to streamline pneumatic and hydraulic control circuits. It is made up of ¼-in. O.D. aluminum or copper tubing gathered in a slow continuous spiral similar to the construction of rope. A tube bundle is first wrapped in water-repellent insulating tape, then encased in heavy rust-resistant galvanized-steel strip such as used for BX electrical cable.

According to its manufacturer, this cable was designed to cut installation time and costs; save critical materials; protect instrument and control connecting lines; conserve space; improve plant appearance. It comes in bundles of 4, 8 and 12 tubes; is capable of transmitting hydraulic control pressures as high as 3,000 psig and all ranges of pneumatic control pressures. Connections and take-offs may be made in standard electrical junction boxes.

Details are in bulletin BA-927.

Lamp Starter

(14) Sylvania Electric Products Inc., 500 Fifth Ave., New York, N. Y.

Designed to cut out a failed lamp and give automatic resetting of the cutout for normal operation when a new lamp is installed, the FS4-NA Robot Cop starter is for use with 40-w lamps. It consists of a glow switch and heater to operate a bimetallic element. The element automatically opens the glow switch circuit after the starter has attempted unsuccessfully to start a worn-out lamp. The heater, in series with the glow switch carrying the full starting current, builds up enough heat while the switch is trying to start a worn-out lamp to cause the bimetal to bend and open the contacts.

The carbon resistor, connected in parallel across the elements, then receives open-circuit voltage. Using only a small quantity of power, the resistor generates sufficient heat to hold the circuit breaker contacts apart while the worn lamp is in the circuit, or until the line switch is closed.

(15) INSECT TRAP—A fixture that fits standard electric sockets, the Newton insect lamp consists of a white plastic bowl and metal fins surrounding a 110-w bulb. Insects are attracted by the light, trapped inside the bowl and killed by the heat. Product of Brass-Copper Lighting Mfg. Co., 609 E. 55th St., Los Angeles 11, Calif.

(16) Bronco 60 cord and cable jackets are branded with identifying data. To simplify measurement of cut lengths, the name Bronco is repeated every two feet. This product is made by Western Insulated Wire Co., 2425 E. 30th St., Los Angeles 58

Constant-Current Supply

(17) Weston Electrical Instrument Corp., 617 Frelinghuysen Ave., Newark 5, N. J.

An electronic constant-current supply, claimed to provide a steady d-c source from an a-c line, is designed primarily for use with potentiometer indicators, recorders and controllers, where automatic standardization is not feasible or use of batteries is not desirable. It is also used with resistance thermometers, strain gages or other devices requiring a constant d-c current.

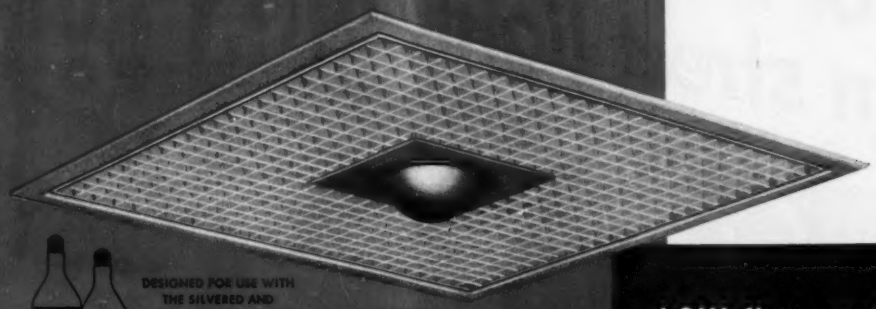
The standard unit is for a 10-ma output at 1.4 v d-c and gives a current with a high degree of stability to well within the limitation of plus or minus 1/10 of 1%, the manufacturer states. Units for other voltages and currents can be supplied on special order.

This model 50220 operates on 115 v, 60 cycles; consists of a regulated input transformer, a 6x4 rectifier, a 5651 voltage reference and a 6SN7 control tube. The special compensated feed-back circuit allows a flat current characteristic over a range of 80-140 v.

(18) TINTING PASTE—A new aluminum paste for polychrome or metallic finishes was designed primarily for automotive equipment but can be used also for household appliances. Designated aluminum tinting paste No. 222; made by Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19, Pa.

(19) BRANDING IRON—A line of serial number electric branding irons has been announced by Hexacon Electric Co., 205 W. Clay Ave., Roselle Park, N. J. They have the numerals 0 to 9 around the periphery of the branding die and a space on the face plate at end of die for additional branding copy.

For More Data Fill in Coupon on Page 60



DESIGNED FOR USE WITH THE SILVERED AND SEMI-SILVERED BOWL LAMPS

Skylike

LOUVERED INCANDESCENT LIGHTING SYSTEMS

LOW first cost...
LOW upkeep...
LOW brightness!

Look into Skylike modern architectural lighting systems—you'll like what you see! Because Skylike systems are designed to bring efficient, low brightness illumination to every application with an initial cost less than systems providing equivalent lighting. They are equally adaptable to suspended or ordinary ceilings. Exclusive features include relamping from floor, built-in reflector surface, silvered bowl lamps. Available in light output to suit your needs. No ballasts, starters or blinking lamps. Simplicity of construction assures easy maintenance, low upkeep!

ILLUMINATION EQUIPMENT
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.

SMOOT-HOLMAN COMPANY Inglewood, Calif. Offices in Principal Western Cities • Branch and Warehouse in San Francisco

for true economy in street light control

THE FISHER-PIERCE PHOTOELECTRIC CONTROL

• LOW INITIAL COST
• LOW INSTALLATION COST
• LOW MAINTENANCE COST

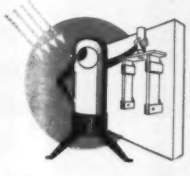
The *cost* of control of street lighting includes more than just the price of the control itself. Cost of installation is another major factor. Maintenance costs, if too great, can overcome all other economies.

The F-P Series 63300B Control combines *all three* elements of economy. No control of similar specifications has as low a purchase price. None requires fewer man hours for installation. No other control has equalled the F-P record for maintenance economy.

Fisher-Pierce is able to provide this economy in street lighting control because of its years of experience and its extensive engineering organization. Fisher-Pierce Controls have been proven by the experience of over 700 utilities now using more than 35,000 Fisher-Pierce units.

If you are considering adding to or modernizing your street lighting, be sure to investigate the possibilities of Fisher-Pierce photoelectric controls.

Write for Bulletin 63300B.



The FISHER-PIERCE CO., Inc.
43 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

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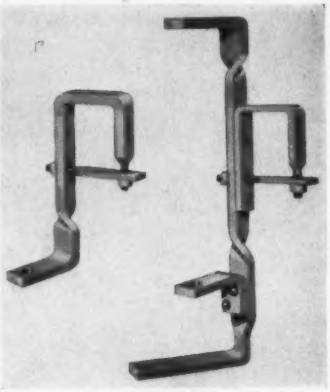


Transposition Brackets

(20) Hubbard & Co., 6301 Butler St., Pittsburgh 1, Pa.

This addition to the manufacturer's line is designed for the heavy loads imposed by long spans, corners and winter icing. Transposition brackets number 9253 (left in photo) and 9264 (right) fulfill REA specifications; clamp solidly on standard 3¼x4¼-in. arms, with ample give-and-take to allow for variations in the dimensions of such arms and to eliminate canting or turning. They are made of ⅝x1½-in. galvanized steel and have 11/16-in. pin holes and ⅜-in. screw holes for attachment with wood or lag screws.

(21) METER—A portable vacuum-tube volt-ohm-milliammeter, model 601, is being marketed by the American Chronoscope Corp., 316 W. First St., Mount Vernon, N.Y. This self-contained instrument is battery operated and has six d-c voltage ranges from 3 to 1,200 v full scale, 13 megohm input impedance; five a-c voltage ranges from 3 to 300 v full range, 6 megohm impedance; 6 ohm ranges from 1 to 100 megohms; 6 current ranges from 3 to 1,200 milliamperes.

(22) TRANSFORMERS—Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill., has developed the model 321 series to take care of the demand for larger inside diameters of Donut instrument current transformers for use with inserted primaries. Maximum O.D. is 5 in.; minimum I.D., 2.25 in.; maximum thickness, 1.75 in.; capacity, 2.5 va; accuracy, 1.2% at full rated capacity; frequency, 25 to 133 cycles; insulated for use on 2,400-v RMS service.

(23) TIMER—Accuracies within one-half per cent of time cycle are claimed for Model 701 electronic timer made by Timetrol Co., Box 193, Rockford, Ill. Time interval is continuously adjustable and accuracy is not affected by supply voltage fluctuations, the manufacturer states. Time intervals from .05 to 20 seconds can be furnished. SPDT relay contacts are rated at 115 v, 5 amp, noninductive. Model 701 operates on 105-130 v, 50-60 cycles.

SAVE COPPER

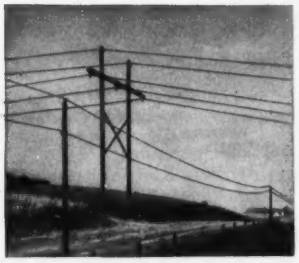
with Copperweld Wire

TRADE MARK

and DO A BETTER JOB - AT LOWER COST!

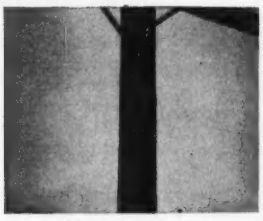
There are many places where you can use Copperweld* Wire to realize copper savings of 60% or more—with no loss in electrical efficiency. The following tested and proved applications are good examples.

*Trade Mark



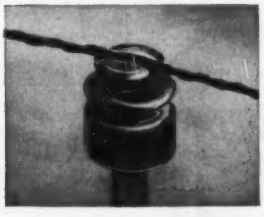
POWER CONDUCTORS

For lightly loaded primary extensions serving small groups of customers, 3 No. 12 or 3 No. 10 Copperweld Conductors usually provide ample conductance and strength for safer long spans. Compared with No. 6 Awg copper, the usual minimum size of copper wire used for overhead construction, the 3 No. 12 Copperweld Conductor saves approximately 600 pounds of copper per mile of single-phase line. Also, for high voltage transmission lines such as 66-kv and 132-kv, Copperweld Strands may be used to carry the smaller currents. Here, copper savings range from 60 to 70%.



GROUNDING WIRES

Annealed Copperweld Grounding Wire is excellent for pole protection and for making the ground connection from overhead ground wires and lightning terminals. In conducting lightning discharges to ground, the electrical properties of Copperweld are similar to those of solid copper of the same diameter. On these installations, there is a copper saving of 70%.



TIE WIRES

Annealed Copperweld Wire can also be used for tying copper-type power conductors to insulators. For this application, the requirements are copper surface, adequate strength, and good pliability. Many companies use Copperweld Tie Wires two sizes smaller than copper thus obtaining a copper saving approaching 80%.

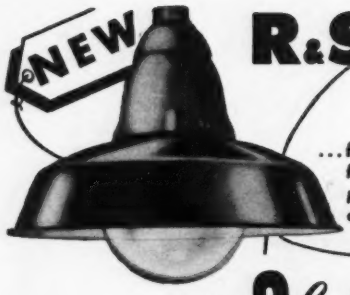
Copperweld Wire uses only enough copper to do what copper does best —conduct electricity and resist corrosion. The protected steel core provides permanent high strength which assures greater safety and less maintenance expense.

Always consider Copperweld—the copper-saving wire that gives you dependability at lower cost.

COPPERWELD STEEL COMPANY

Glassport, Pa.

Pacific Coast Office
Monadnock Bldg., San Francisco



NEW **R&S** DUST-TIGHT LIGHTING FIXTURES

...for hazardous locations where flammable or explosive dusts are present. Class II, Groups E, F, G and Class III.

With 2 Exclusive Design Features

R & S Type DL Lighting Fixtures contribute outstanding advances in fixture construction and installation simplicity! They operate very cool—'way below allowable temperatures for this type of installation.

Two *exclusive* design features, in addition to basic advantages common to other well-constructed dust-tight fixtures, assure faster, easier installation, cleaning and relamping. They're made of cast aluminum alloy—designed with streamlined simplicity—and shaped to prevent dangerous accumulation of dust particles. Write for Information Data Sheet No. 7151-10.

1 Lampholders are located within the conduit box assembly of both pendent and junction box types, permitting installation and wiring without regard to size or style of fixture.

2 All fixture—globe—Reflector assemblies fit either base and are easily attached or interchanged by means of a simple bayonet slot and screw arrangement, without disturbing electrical connections.

Pendent and Junction Box bases standard to all fixtures. They accommodate any fixture—globe—reflector assembly in 100 or 200 watt sizes.

RUSSELL & STOLL COMPANY, INC. • 125 BARCLAY STREET, NEW YORK 7, N.Y. F-1

RUSSELL & STOLL

PRECISION-BUILT ELECTRICAL EQUIPMENT—SINCE 1902

Port-A-Pony

featherweight Portable

PIPE THREADER

Truly a feather weight, the Port-A-Pony weighs only 26 pounds and is ideal for threading conduit and pipe in the shop or field. Use the Port-A-Pony to thread any ¼" to 4" pipe in place. The ½ h.p. reversible motor operates on 110 volts AC or DC. Heavy duty case hardened gears are mounted in a rugged magnesium alloy casing. Adaptable to your die stocks. Write for full information today.

THREAD-EZY MFG. CO. CORUNNA MICHIGAN

Photoflash Check

(24) Westinghouse Electric Corp., Lamp Division, Bloomfield, N. J.

A photoflash synchronizer test lamp, the Flash-Chek, is said to provide a simple means of checking photoflash synchronizers. The test lamp gives an indication of the condition of the batteries by its relative brightness. Assuming the batteries to be of a usable strength, the lamps check for faulty wiring or socket connections and overall continuity of the camera synchronizer circuit. They can be used also to check synchronization of shutter and lamp and to check position of reflectors.

Elimination of complicated adapter sockets is said to give a test lamp that is one-third the cost of previous devices. The PT-1 Flash-Chek has a bayonet base and is for use with smaller flash holders; the PT-2 has a screw base and is used for larger flash holders and bulbs.

Bar Hangers

(25) Keystone Mfg. Co., 23328 Sherwood Ave., Center Line, Mich.

Four types of bar hangers added to the manufacturer's line are brake-formed from 3/16x½-in. band steel, with rounded mill edges. Sliding studs are said to be easy working and double strength. The hangers are Underwriters' approved and come in straight, shallow, deep or universal offset types as separate units or in combination outlet box and bar hanger assemblies. Standard lengths in stock include 19½, 21 and 24 in. Special lengths on request.

Junction Box

(26) Keystone Mfg. Co., 23328 Sherwood Ave., Center Line, Mich.

A 2½x2½-in. flanged wireway junction box can be used also in place of elbows, tees and crosses. Two removable closing plates with knockouts are included. All holes required for assembly are pierced. UL approved.

(27) WINDOW FAN—A 16-in. portable circulator fan may be used as a window fan for night cooling to pull cool air into the house or exhaust hot air from it, and as a circulating fan during the day. It requires no installation and therefore is suited particularly for casement windows. It is adjustable from 28 to 48 in., floor to center of blades. Vertical tilt adjustment permits directing air flow within an arc of 180°. Product of Emerson Electric Mfg. Co., St. Louis 21, Mo.

You . . . are Yesterday's Children

YES, you are yesterday's children. You . . . the banker, the lawyer, the utility executive, the engineer, the purchasing agent, and so on! Yesterday, it was baseball or football. Today, it's business . . . and business is good . . . or bad . . . because of your planning and decisions.

Many utilities today are enjoying the fruits of wise planning and direction, planning which foresaw today's volume and requirements. That many of you chose Moloney equipment in preparing for this peak, is a tribute to your foresight and to our integrity in producing only the best and most dependable equipment . . . to help you give *better* service . . . at *all* times.

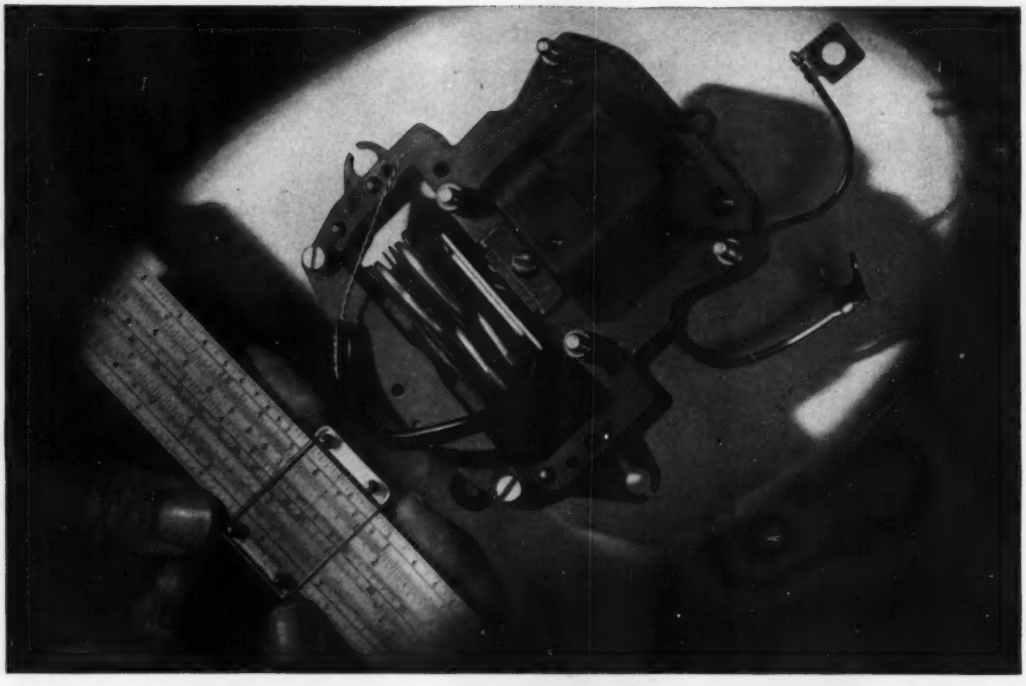
MEES-13

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers Step Voltage Regulators • Unit Substations

MOLONEY ELECTRIC = BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA



Sangamo J Meters

designed for maximum stability

Sangamo Type J Watthour Meters have a factual record of sustained high accuracy. This high accuracy is no accident. Important electrical and mechanical features have been combined with skilled manufacturing techniques and the latest statistical quality control methods in order to embody the desired quality characteristics into these meters.

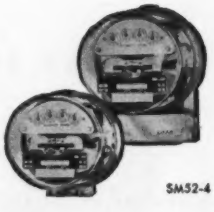
With maximum stability as the principal design goal, liberally designed potential and current elements combine to insure accurate registration from the lightest loads to loads well over four times the nominal current rating.

The exceptionally high driving power of the Sangamo J Meter is another important factor in assuring its stable registration. There is ample torque in the moving system so that at light loads increases in friction rarely affect registration.

Only Measured Facts are Known Facts

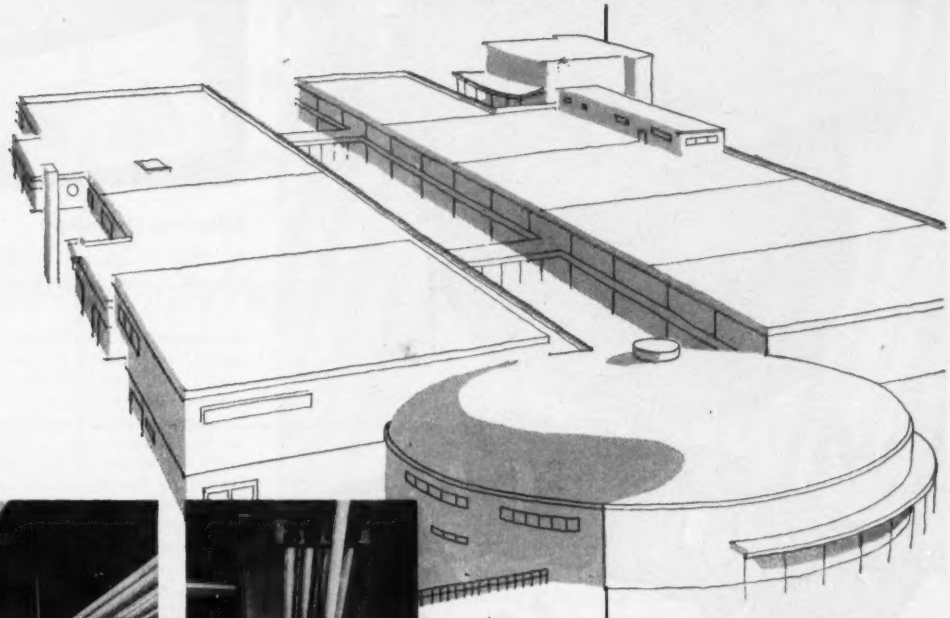
SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

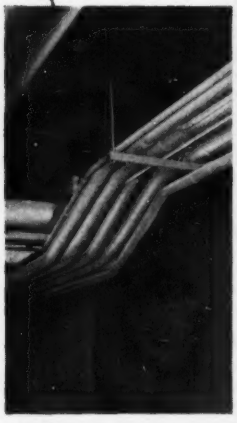
Sangamo J Meters have proved their ability to meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.

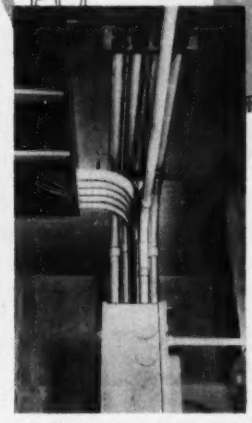


SM52-4

IT'S AMERICA'S MOST COMPLETE SHOPPING CENTER







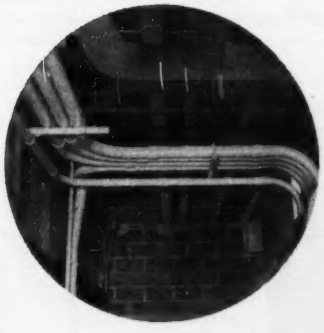
and another **SPANG®** CENTRAL CONDUIT installation

For years architects and merchandisers have been talking about Shoppers' World in Framingham, Mass.—the project that started the whole regional shopping center movement. With 44 stores and parking for 6000 cars, it's the newest, most refreshing note in American merchandising.

Outstandingly modern in architectural design, Shoppers' World is also outstanding for its well planned electrical design. Like so many other projects where the closest attention is given to every electrical detail, Spang Central Conduit was selected to protect all the circuits.

It's one more example of the faith that prominent contractors, architects and owners place in the *truly dependable, quality-controlled* conduit—Spang Conduit.

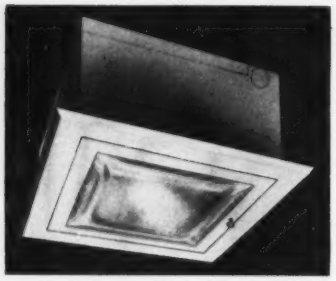
You, too, will find it pays to use these *better* conduits by Spang—"Cenlaco," "Central White," "Central Black" and "Central EMT." You'll like the consistent high quality and the faster threading, cutting and bending.



Owner: Jordan Marsh Co., Boston, Mass.
Designed by: George L. Ely
Architects: Ketchum, Gina & Sharp
Consulting Architects: Anderson & Beckwith
Contractor: C. B. H. Macomber Co.

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
PITTSBURGH 30, PA.
District Offices and Sales Representatives in Principal Cities

WIRE AND CABLE
WITH
BRONCO 60
Certified
PORTABLE CORD AND CABLE
YOU GET
• MORE NEOPRENE IN THE PROTECTING JACKET! It is Certified to contain not less than 60% by weight of new Neoprene. This ... INCREASES SAFETY MARGIN, INCREASES RESISTANCE. INCREASES SERVICE LIFE!
• LONGER-LASTING COLD RUBBER INSULATION!
• GREATER FLEXIBILITY!—engineered, rope-like flexibility.
• MORE CONVENIENCE! Jackets are branded with full identifying data. Coils are packaged in neat shelf cartons.
Bears symbol "P116BM," flameproof registration number of the U. S. and Pennsylvania Bureaus of Mines.
Bronco 60 Certified is an Achievement of
WESTERN INSULATED WIRE CO.
LOS ANGELES 58, CALIFORNIA



Diffusing Downlight

(28) Pittsburgh Reflector Co., 406 Oliver Bldg., Pittsburgh 22, Pa.

An inexpensive incandescent unit designed for recessing into ceilings, model 2450 gives low brightness and diffused illumination. It requires 5½ in. of space above the ceiling line and can be fitted into a 10-in. square opening. Over-all size of the unit including ceiling flanges is 12½ in. square. Interior and exterior finish has a minimum reflective value of 87%. Maximum lamp size is 150 w.

A companion unit, the 2458 Downlight, is equipped with an additional socket fitting a lamp up to 15 w for use as a night light. Both units are Underwriters' approved. Details in bulletin 2450.

Adjustable Fixtures

(29) Swivelier Co. Inc., Dept. P, 30 Irving Place, New York 3, N. Y.

Vogue-Lites, adjustable lighting fixtures in colors to blend with modern interiors, are available for direct and indirect lighting. The new Cosmopolitan shade accommodates up to 100-w regular or 75-w R30 lamps. The line has 26 models including units for 3¼- or 4-in. outlet box attachment as well as for wall mounting; portables; clamp-ons; screw-ins; clusters; extension pipe and outdoor units. Comes in six colors: rose, green, yellow, grey, silver, brass. Details in bulletin 131.

(30) BRACKET—The Vaportight bracket made by McPhilben Mfg. Co. Inc., 1329 Willoughby Ave., Brooklyn 27, N. Y., is for entrances, stair landings and wherever protected fixtures are desired. Wall plate of this 43-1 model is 5 in. wide, covers any type of outlet box and irregularities such as open spaces, plaster or broken tile around the outlet box.

(31) MOTOR—A new Cyclohm induction motor, model 3700, rated 1/25 to ¼ hp and featuring a new resilient mounting base is offered by Howard Industries Inc., Racine, Wis.

Congratulations to the Winners of the

George A. Hughes Awards for 1951

Your successful promotions of major electric appliances during 1951 are achievements for which Hotpoint, as well as the entire electric industry, heartily congratulates you.

As a result of these accomplishments, you—during the past year—have led America's electric utility companies in bringing greater comfort and convenience to their customers through modern electrical living.

Hotpoint takes pride in recognizing the accomplishments of these outstanding utility companies and their employees—winners of the George A. Hughes Awards for 1951.

Utility Companies with Over 150,000 Meters

Southern California Edison Co., Los Angeles, Calif.
- Electric Kitchen Promotion

Carolina Power and Light Co., Raleigh, N. C.
- Electric Range Promotion

Metropolitan Edison Co., Reading, Pa.
- Water Heater Promotion

Cincinnati Gas and Electric Co., Cincinnati, Ohio
- Dishwasher Promotion

Pennsylvania Power and Light Co., Allentown, Pa.
- Commercial Cooking Promotion

Utility Companies with Under 150,000 Meters

Kentucky and West Virginia Power Co., Ashland, Ky.
- Electric Range Promotion

Central Ohio Light and Power Co., Findlay, Ohio
- Water Heater Promotion

Iowa Power and Light Company, Des Moines, Iowa
- Dishwasher Promotion

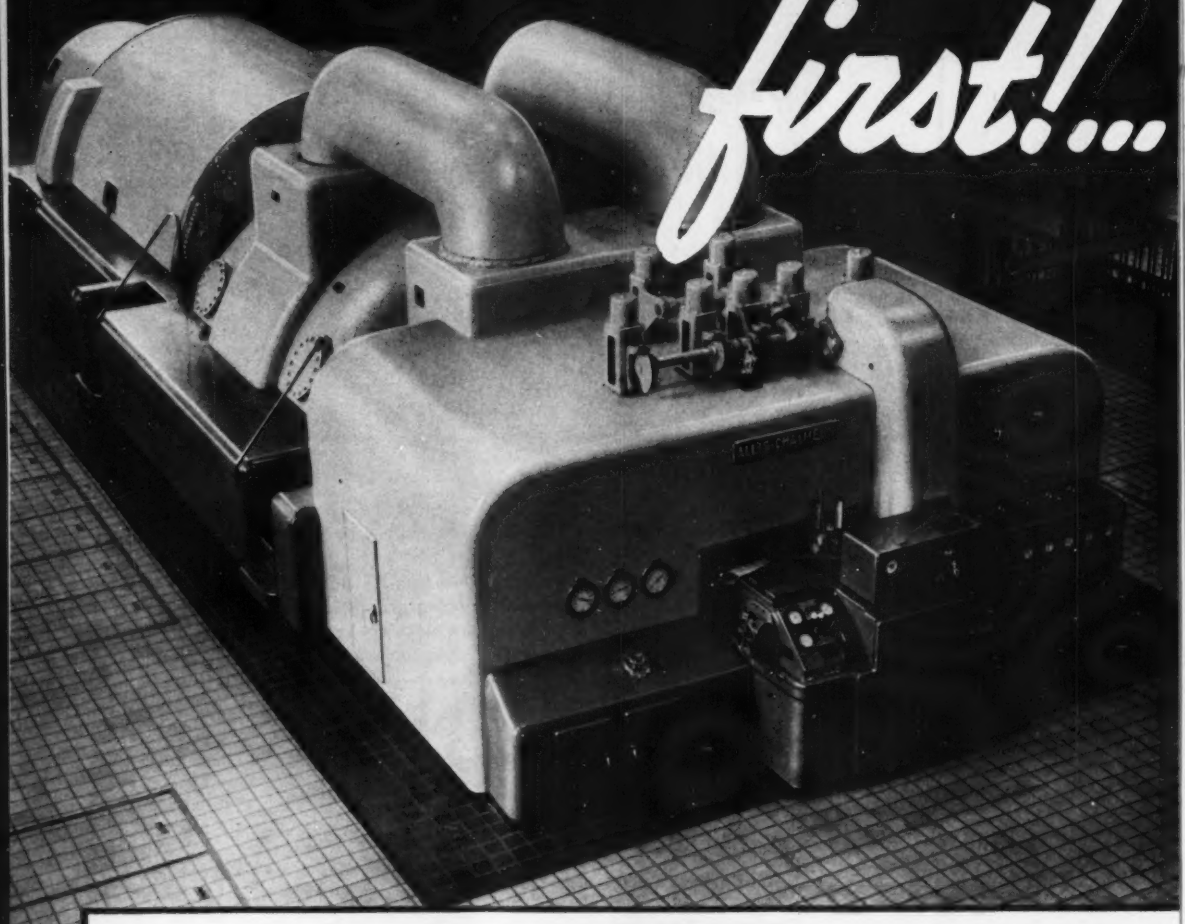
Hartford Electric Light Company, Hartford, Conn.
- Commercial Cooking Promotion

PLAN NOW to enter the 1952 Competitions. Watch for details—to be announced soon.

Hotpoint Inc.

5600 W. Taylor Street, Chicago 44, Illinois

ANOTHER ALLIS-CHALMERS *first!...*



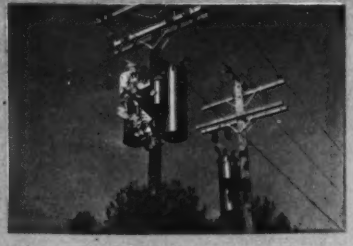
Equipment for Power: Water Conditioning equipment, chemicals and service . . . Steam and Hydraulic Turbines . . . Generators . . . Condensers . . . Steam Jet Air Ejectors . . . Power Plant Pumps and Motors . . . Transformers . . . Circuit Breakers . . . Switchboards and Control . . . Switchgear . . . Unit Substations . . . Utilization equipment.

ALLIS-

IT PAYS TO KEEP PACE WITH MACHINERY PROGRESS

Extend Distribution Regulator Line

Low-cost ⅝% step distribution voltage regulators are now available for every feeder. Additional ratings continue the long line of firsts for the power industry—paced by the introduction of ⅝% step regulators 19 years ago.



Supercharged Cooling

On-the-Line Performance of New-Design Turbine-Generator Proves Worth of Cooling with High-Velocity Hydrogen in Direct Contact with Conductors

IT'S BEEN SAID that good things come in small packages, and here's one that definitely does. Supercharged hydrogen cooling of this turbine-driven generator permitted a reduction in length sufficient to provide numerous design, installation and operating advantages.

Already proved in operation at the Wisconsin Power and Light Company's Edgewater Station, this precedent-setting turbine-generator is to be duplicated in two additional units now on order for the same company.

CHECK THESE ADVANTAGES

In this 60,000-kw, 3600-rpm turbine-generator, a two stage centrifugal compressor integral with the rotor drives hydrogen *through* the rotor conductors at high velocity. This supercharged cooling provides these advantages:

- Generator length reduced—permitting smaller plant size.
- Generator weight cut 25 percent — reducing foundation requirements.
- Subtransient reactance increased — permitting smaller breakers and bus structures, and resulting in lower torques under fault conditions.
- Differential expansion reduced, due to shorter length and greater temperature uniformity.

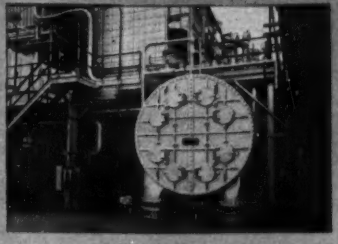
DISCUSS YOUR NEEDS

Because of pioneering achievements like this, you know that you can rely on Allis-Chalmers for engineering leadership in power production and distribution equipment. And you gain most when you call in your A-C representative during the early planning stages. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3651

CHALMERS AC ALLIS-CHALMERS

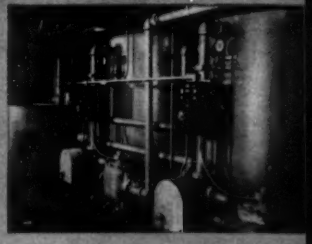
Built for Outdoor Operation

Condensers and auxiliaries are being built for more and more outdoor central-station installations, and Allis-Chalmers is continually developing improved designs for such money-saving power plant applications.

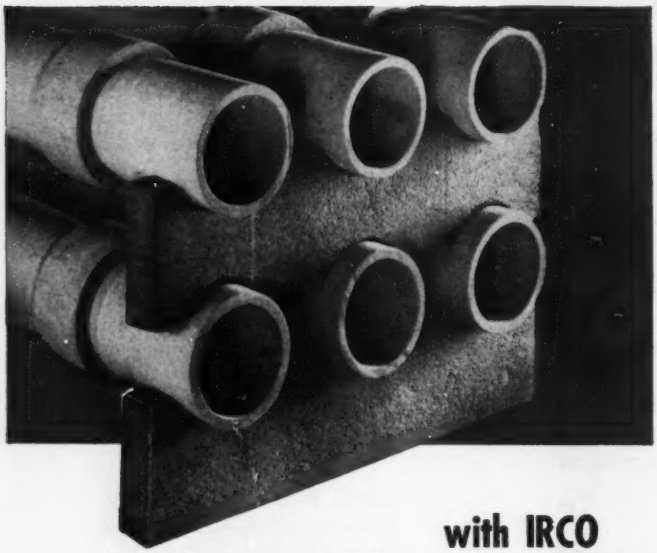


Add New Ion Exchangers

Demineralizers, ion exchangers and water conditioning equipment, chemicals and service of all types — including latest alkalinity-reducing ion exchangers — are available, engineered to fit your requirements.



Now! SAVE MONEY... SAVE TIME...



with IRCO PACKAGED Light-Weight Duct Spacers!

Packaged for faster handling, storage and job-site distribution, the Irco Duct Spacer will actually save you money on the job!

- ✔ BREAKAGE LOSSES MINIMIZED
- ✔ LESS WEIGHT TO HANDLE
- ✔ GREATER STRENGTH
- ✔ CARTONED FOR FASTER HANDLING ON THE JOB
- ✔ PRECISION-MADE OF LIGHT-WEIGHT AGGREGATE
- ✔ WIDE RANGE OF STANDARD SIZES, OTHER SIZES MADE TO SPECIFICATION

Investigate this money-saving convenience *today!*

ASK YOUR JOBBER—WRITE FOR COMPLETE INFORMATION

Irco SPACERS

Insulating Refractories Co.
McNears Point, San Rafael, Calif.
Mail Address:
P.O. Box 322 San Rafael, Calif.

Lighting Fixture

(32) Appleton Electric Co., 1701-59 Wellington Ave., Chicago 13

The new AA-51 series explosion-proof lighting fixture is available in sizes ranging from 60 to 500 w and is listed by Underwriters' for Class 1, Groups C and D, hazardous locations. A new feature is full-circle venting (use of the entire lower edge of the hood as a continuous louver), which is combined with porous metal interiors to give more even heat distribution and cooler operation. Wire-free canopy construction allows instant removal of the entire fixture, it is pointed out. Clean, freshly lamped fixture units can be exchanged for those taken down. Should current be on when fixture is removed, five full threads on canopy are engaged whenever contact is made or broken.

Lamp Guards

(34) McGill Mfg. Co., Valparaiso, Ind.

A grounded portable light that includes an approved 3-wire convenience outlet has two cage designs. One features a concentrating end lens and rotary reflector for focusing light where it is needed. The other has the No-Rol cage and reflector and is made of heavy steel wire. The convenience outlet is a part of the molded phenolic handle. This 5000-G series conforms to requirements of UL and Insurance Inspectors.

(34) SAFETY HAT—Plastiglas Hedgard, a new hat is claimed to combine style and comfort with strength, high dielectric properties, shock-absorbing features. It is made in two models, one with a broad, slanting brim on the back, sides and front, the other with a front, visorlike brim. Standard finishes are aluminum and brown. Made by Davis Emergency Equipment Co. Inc., Newark, N. J.

General Electric's Type IRS single-phase induction voltage regulators (shown above) and the three-phase Type IRT's provide the finest regulation obtainable for heavily loaded, urban feeders.

Class I Accuracy Controls now standard on these G-E Regulators

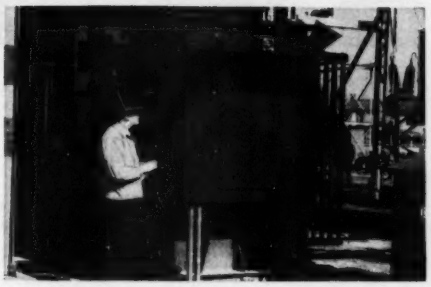
Highly accurate controls that decrease voltage spread—permit your feeders to carry more load . . . at no extra cost

Today, with power demands on your feeders rising, the increased accuracy of these G-E voltage regulators becomes a significant system design tool.

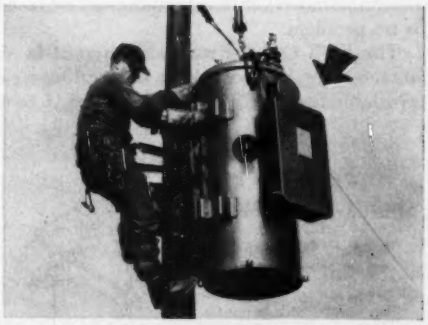
The controls on these regulators meet rigid ASA Standards for Class I accuracy. They have an *over-all* error of not more than ± 1%—99% accuracy—regardless of operating changes in temperature, frequency or load.

As a result, when you use these G-E regulators, you can tolerate more drop in your regulated feeders without at any time exceeding established voltage limits. Your existing feeders can carry heavier loads for greater distance. And your new construction can be designed with this increased load-carrying capacity in mind.

For further information on what Class I accuracy can mean to you, write for GEA-5690. *General Electric Company, Schenectady 5, New York.* 404-87



General Electric's Type MLT32 step voltage regulators are ideally suited for three-phase circuits that require close, accurate voltage regulation.

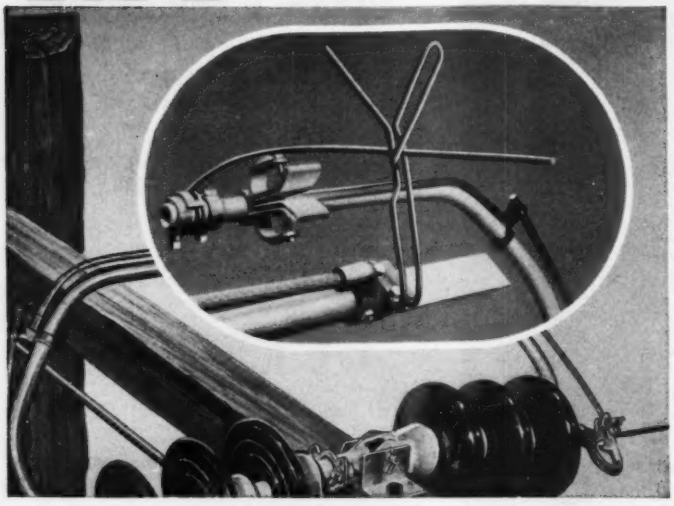


General Electric's Type ML32 single-phase step voltage regulators permit you to set new standards of regulation on your branch and rural circuits.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

KPF POLE TOP SWITCHES



Drop 40 miles of 69 kv lines with KPF Quick-Break pole top switch

Operating engineers tell us KPF switches with Quick-Break attachment are the most outstanding air-break switch improvement in 25 years. Before development of this Quick-Break device, pole top switching of 69 kv circuits was limited to some 6 miles of line. Now, operating experience shows that 40 miles of 69 kv line can safely be dropped with this equipment.

The secret of the KPF Quick-Break is a heavy-duty cat's whisker which whips free in a split second as the switch is opened. This mechanism prevents establishment of an arc; thus critical arc length is no problem.

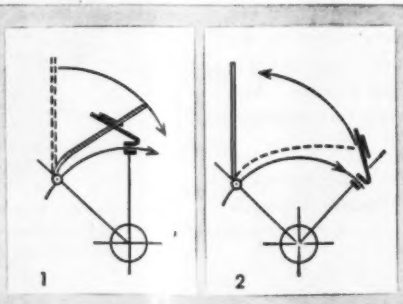
The KPF Quick-Break attachment is simply and ruggedly constructed for low cost, long life and all-weather dependability. It is available for all KPF switches rated 15 to 69 kv.

HERE'S HOW KPF QUICK-BREAK WORKS

1. Spring rod winds to full tension as switch opens.

2. Rod springs clear, breaking contact at high speed.

Write for details of KPF Quick-Break attachment and low cost, long-lasting, easy-to-install KPF Switches.



KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton, California

Distribution Transformers

(35) Pennsylvania Transformer Co., Box 330, Canonsburg, Pa.

Four sizes have been added to the manufacturer's line of pole star distribution transformers: 167, 250, 333 and 500 kva. They are available in all standard voltages through 44 kv. As are the 3- to 100-kva pole stars, the new 167- to 500-units are built around a patented core of oriented electrical steel. Exciting currents in the new transformers are 75% less than in the manufacturer's former stacked core distribution transformers, it is stated, and weights are down as much as 30%. Up to 35% less oil is used and 20% less floor area is required. Details in catalog No. 352. Illustration shows 500-kva transformer.

(36) STRAIN RELIEF BUSHING—Heyco nylon strain reliefs, sizes 3L and 3P, are for sheet metal, spun or cast base lamps. They absorb cord pull push and torque, eliminate special grommets, tapping and wire knots, give nylon insulation at entrance hole and lock the wire to the base. Underwriters' approved. Made by Heyman Mfg. Co., 100 Michigan Ave., Kenilworth, N. J.

(37) FAN—A heavy-duty direct-drive fan for industrial applications, duct work, mine exhaust systems, etc., has a totally enclosed, ball bearing motor, nonoverloading, cast-aluminum airfoil-type propellers. Units come in sizes from 16 to 48 in. and air deliveries from 2,900 to 37,000 cu ft per minute. Bulletin 403-A and catalog 400 from Chelsea Fan & Blower Co. Inc., 639 South Ave., Plainfield, N. J., give details.

(38) WIRING DEVICES—The Hart-Lock made by The Arrow-Hart & Hegeman Electric Co., Hartford, Conn., is a current-carrying device that locks in position to prevent accidental disconnects. It is installed in the same manner as other connecting devices; positive lock is assured by a twist of the cap in the connector body or receptacle.

IS NEOPRENE ALL YOU WANT?

On all sides buyers ask, "Is the jacket of that cord or cable neoprene?" When assured that it is, they seem quite satisfied that they are getting the highest quality product available. That is not necessarily a sound conclusion. Here's why.

Neoprene is only a raw material. To be of use it must be **properly** compounded with antioxidants, carbon black, vulcanizing agents, and other materials. In other words, technical skill in properly compounding neoprene is just as important as using neoprene itself.

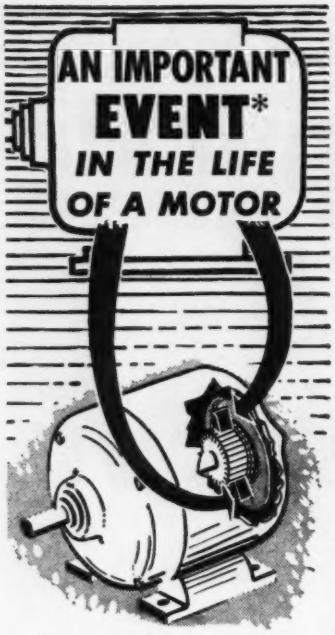
TIREX Cords and Cables were the first to be made in this country with a heavy duty jacket. Proof of the fact that compounding skill is important is shown by the fact that in the intervening thirty years TIREX has kept the leadership in the field of portable cords and cables. Simplex skill developed the cords and then kept them leaders against all comers.

The next time you need a portable cord or cable specify and be sure you get Simplex-TIREX Cords and Cables. The name is embossed on the jacket for your protection.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.



*
INSTALLATION OF
GOOD
BRUSHES

Quoting Napoleon's theory "An Army Travels on Its Stomach" we prefer a theory that has been proven by the performance of the motors in your plant:—"motors and generators perform efficiently in proportion to the quality of their brushes." Look to OHIO for efficient operation and write to us for our catalog in your category:—Industrial, General Purpose, Mining, Welding, Appliances.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

BULLETINS ETC.

(39) INDUCTION MOTORS—Construction features and types of Allis-Chalmers large vertical induction motors for pumps and other vertical drives are described in a bulletin available from the manufacturer at 939 S. 70th St., Milwaukee, Wis. This bulletin (05B7629) covers motor ratings in 40 C, 60 cycles from 60 hp, 200 rpm to 800 hp and larger at 1,800 rpm.

(40) Labels—Wire markers, safety signs, etc., are listed by W. H. Brady Co., Dept. 185, 1630 E. Spring St., Chippewa Falls, Wis., in a catalog of its self-sticking industrial products.

(41) FITTINGS — New listings for aluminum cable are included in a 32-page catalog of its compression connectors released by The Thomas & Betts Co., Inc., 70 Butler St., Elizabeth, N. J. To help in ordering, this bulletin 67 carries, following the wire size, the catalog numbers for standard connectors and for all necessary installing tools.

(42) DATA BOOK—A 330-page revised edition of its electrical data book for architects and engineers has been released by Westinghouse Electric Corp. It was published to keep up with the rapidly growing construction business and includes information on new equipment and methods of using it, as well as an entire new section on power distribution. Available from the nearest Westinghouse district office or from Westinghouse Electric Corp., Technical Publicity, P. O. Box 1017, Pittsburgh 30, Pa. Designated B-2161-E.

(43) INSULATION—Electrical insulating papers, including rag, part rag, wood pulp and rope papers, pressboards and electrical fiber, are described in a 12-page catalog prepared by Insulation Manufacturers Corp., Publications Department, 565 W. Washington Blvd., Chicago 6, Ill. Data on advantages, properties and applications are supplied.

(44) WIRING—A 4-page bulletin, "20 Questions and 20 Answers on Safety m. i. Wiring," gives characteristics of this new wiring system. A table of types, sizes, weights and lengths is included. Available from General Cable Corp., 420 Lexington Ave., New York 17, N. Y.

(45) MOTOR OPERATING MECHANISM—Type MG-9 for group-operated air switches is covered in catalog section 176 from Pacific Electric Mfg. Corp., 5815 Third St., San Francisco 24, Calif. This mechanism has 180° stroke, 4-second operating time, inspection doors on both sides; is equipped with ¼- 1/3- or ½-hp reversible motor according to size of air switch.

(46) MINIATURE LAMPS—General Electric Lamp Division, Nela Park, Cleveland, has issued a 36-page catalog listing and illustrating types of miniature lamps and their applications.

(47) INSTRUMENTS—Bulletin 10A from Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill., gives information on instruments for testing electrical insulation resistance, ground resistance, dielectric strength, instrument current transformers, etc.

(48) LIGHTING MAINTENANCE—A 12-page bulletin, "The Why, When and How of Modern Lighting Maintenance," is available from Sylvania Electric Products Inc., Lighting Division, 60 Boston St., Salem, Mass.

(49) RESISTANCE THERMOMETERS—Thermohms to detect temperatures between —325 and +1,000 F are described in a 38-page catalog published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after July 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

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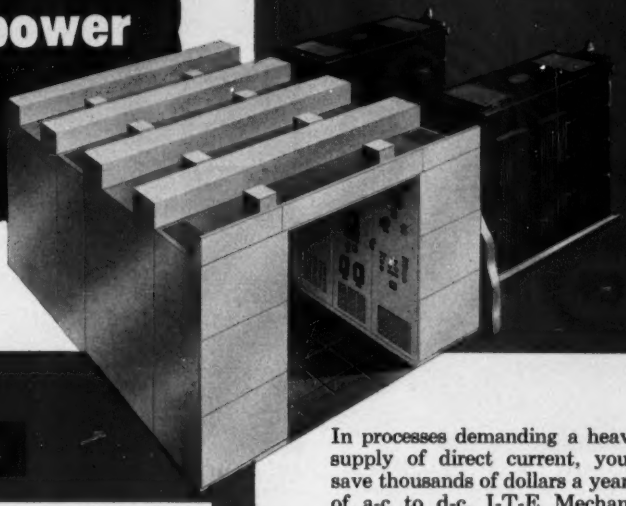
I-T-E Mechanical Rectifiers

96% conversion efficiency from a-c line to d-c bus!



HOW IT WORKS

Take a sine wave

Modify it like this with a *Permeron-core reactor

Make contact here — Break contact here

Do it 1,296,000 times an hour and get this

. . . with a conversion efficiency of 96% or better

*I-T-E's special saturable core material.

In processes demanding a heavy, dependable supply of direct current, you can actually save thousands of dollars a year on conversion of a-c to d-c. I-T-E Mechanical Rectifiers convert purchased power with *96% overall efficiency* from a-c line to d-c bus. This gives you more d-c for your power dollar.

This power cost savings curve, based on figures published by *Chemical Week*, shows how much you can save with only a slight boost in efficiency.

For example, suppose purchased power requirements are 2000 KW for 24-hour operation, 350 days a year. A 3% gain in power conversion efficiency using the I-T-E Mechanical Rectifier can save more than *$3500* a year.

FIGURE IT OUT—

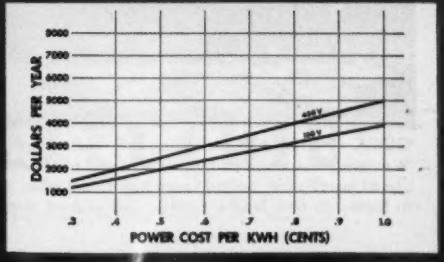
2000 x 24 x 350 = 16,800,000 KWH/year

With a 3% improvement in efficiency you save:
(16,800,000) (.03) = 504,000 KWH/year

Assuming a nominal industrial rate of 7 mills/KWH:
(504,000) (.007) = $3528 yearly saving

HOW MUCH CAN YOU SAVE?

Check your own power consumption costs. See how much you can save with the high efficiency I-T-E Mechanical Rectifier. For details, write for Bulletin 5106 today. I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Phila. 30, Pa.

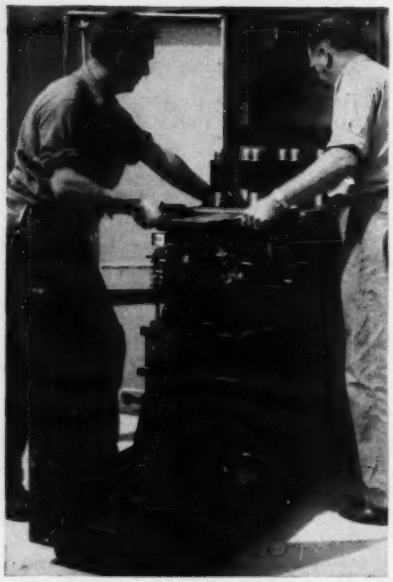


MECHANICAL RECTIFIERS

I-T-E CIRCUIT BREAKER COMPANY
19TH AND HAMILTON STREETS, PHILADELPHIA 30, PA.

Mechanical Rectifier Division

Canadian Mfg. and Sales: Eastern Power Devices, Ltd., Toronto
Export Sales: Philips Export Corp., N.Y. 17, N.Y.



EASILY REMOVABLE CIRCUIT BREAKER facilitates inspection or replacement. This *vertical-lift* breaker cannot be moved in or out of operating position unless contacts are open.

AUTOMATIC G-E LOAD-RATIO-CONTROL unit eliminates separate voltage regulator. Control panel shown above has raise and lower push buttons, position indicator and operations counter. Some G-E LRC units have made over 1,000,000 tap changes without appreciable wear.

Utility finds quick answer to growing loads with G-E Packaged Substations

QUICK INSTALLATION: This G-E substation for the Western Massachusetts Electric Co. was trucked directly to site of installation, bolted to waiting foundation, connected to high-side and feeder cables, and placed in operation.

Standardized factory-assembled substations simplify utility expansion.

Faced with rapidly growing loads on one side of Pittsfield, Mass., the Western Massachusetts Electric Company found a ready answer when it ordered and installed the G-E unit substation shown at left. By selecting a standard unit directly from G-E specifications, it not only got quick delivery of a complete, ready-to-operate substation, but also saved time and money all along the line—from initial planning through to final installation.

When the need for further substation capacity developed on the opposite side of town, standardized equipment again was the answer—even to the necessary steel structure, as shown in the photograph on the opposite page.

The trend to standardized equipment, as the logical cost-saving way to meet growing loads, is evident in utility expansion programs across the country. Because of their great flexibility, G-E unit substations are applicable to a wide variety of system arrangements. For full information, write for Bulletins GEA-3800 and GEA-4500. *General Electric Co., Schenectady 5, N.Y.*

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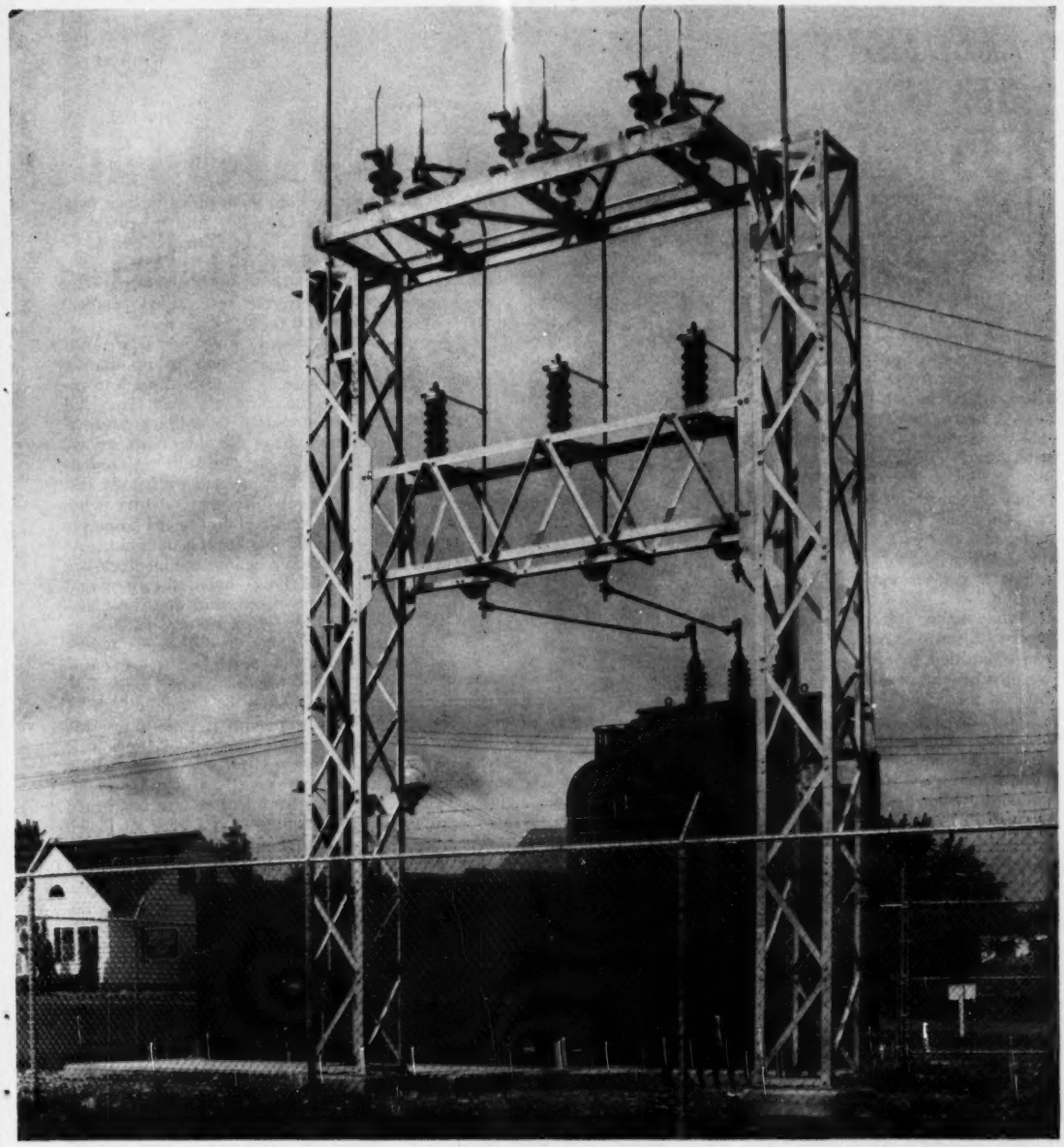


EVERYTHING STANDARD—INCLUDING THE STRUCTURE: One of the latest substations installed by the Western Massachusetts Electric Company, this unit was supplied complete, even to the steel structure for the incoming high-voltage lines. Standardized equipment like this eliminates weeks of detailed planning and engineering, simplifies purchasing. Trained engineering personnel have more time for the important work of broad system planning. The trend is to "standards"!

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

ELECTRA'S HUSBAND

"DID you see in the paper tonight where a Cadillac salesman in Piedmont who has been making $18,000 a year has had to go on the picket line in the automobile salesmen's strike? My heart bleeds for him," Electra's lip curled as she announced it.

"Just goes to show how ridiculous it is for salesmen to be made to join a union," I retorted. "Salesmen, good ones, I mean, don't want to be hog-tied by a union. They are individual enterprisers. They prefer a commission and a free opportunity to make as much money as they can sell goods. They don't want to be tied to hours or working rules. When unionism invades selling, that's the end of salesmanship."

"What makes you say that?" argued Electra. "Aren't sales people entitled to some of the so-called benefits of labor in such times as these?"

"Now, my dear, aren't you the one who keeps telling me that sales people don't know their merchandise any more, hardly give you a civil answer, ignore you when you come in to buy? What do you suppose makes them so cocky and indifferent and so inefficient as sales people?"

"I don't see what unions have to do with it. Aren't you seeing shadows of unions in everything these days just because you don't like the way they are dominating the federal government?" asked Electra with a tease twinkle in her eye.

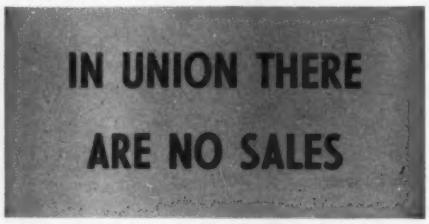
"No, I'm not. Why is it they don't know the merchandise? Well they refuse to attend sales meetings in the morning any more. At these the manufacturers' representatives used to give them a demonstration of the goods, tell how they were made, answer any questions and give the salespeople some working knowledge of what they were selling. But now if the boss wants to call a sales meeting he has to pay overtime for it or do it on store time when they should be tending to the customers. When the union started telling the boss how to run his business they put in that rule. Now, few if any sales meetings. No product information. Little sales training."

"You may have something there, but I don't see what unions have to do with courtesy and attention to customers. It isn't against union rules, is it, to be decent to a customer?"

"You'd think so, sometimes, if you read some of these union contracts. It may not be written in there specifically, but often the implication is there."

"How do you mean?"

"By ruling out any extra services without extra pay for them, little things that used to be part of a desire to please or to give personal attention to keep a customer's good will. Some contracts thus make it expensive for the store owner to permit his clerks, they aren't sales people any more, to do some of these little things. They can't make home calls any more to sell when man and wife are together to make an important decision. They can't call a customer after hours to tell them something they are waiting for is in. They shut the door in your face at the precise second of closing time, making you feel like a heel to still be in the store that late, even if it is the only chance you have to come in. They don't care if they get the business, they get paid the union scale anyway. Why be a good salesman, a mediocre one gets just as much pay? That's what I mean."



"But surely the union leaders have some idea of the need for selling. Weren't some of these rules put in because of abuses?"

"Maybe in a very few cases, but to my observation most of the abuses were dreamed up. They are used as reasons to join the union and appealed to the lazy and the mediocre. Not to be shown up as such they want the union to force everyone into it and then level them off to their own level. The really competent don't need a union. They are always better off on their own. The others gang up on them to hold them down to their own speed or capacity. And by doing so they kill all the initiative to do a better selling job."

"I thought unions bragged that they represented the best skilled people," said Electra.

"That was long ago, my dear. That was when they were selling unions, not forcing them on business and industry by government edict. They did take some pride in training apprentices in some of the older craft unions, but in these modern mass unions of everyone and everybody just to get dues, there is little sense of responsibility to the employer or the public. It is all gimme. At union meetings the members are told how abused they are and overworked, and the whole emphasis is on getting paid more for doing less. Business wasn't built on that plan. It won't survive on it. That's cancerous, self-destroying. And to afflict salesmanship with it is to infest the last line of defense with it. Socialistic salesmanship is no sale at all. Selling involves work.

"The manufacturers are concerned over it. Selling is at a very low level. In desperation, because times are not very good, despite all that's said, they are trying heavy barrages of advertising. Since the salespeople have become robots, the makers of products are trying to sell over their heads by mail, magazine ads, newspapers, TV, radio—everything but people. They hope you'll read or hear and be convinced and go in and demand their product. I, for one, don't think it will work.

"Meanwhile some individuals who still want to be individuals and salesmen will still go out to customers, homes and make sales. There are still a lot of vacuum cleaner sales made that way. These food plans that are cleaning up right now are sold by man-to-man selling in the old-fashioned way. Once in a while you find a small individual dealer who isn't afraid to work a few nights calling at his customers' homes, and he is doing all right.

"There's still some spark of individual enterprise left in America, despite the organized mediocrity trying to put it in the bag."

GET *Low Cost* LOAD CHECK WITH THE NEW

Thermalite OVERLOAD INDICATOR

DISTRIBUTION TRANSFORMERS

LOOKING FOR AN INEXPENSIVE, practical way to load survey your distribution system? Why not investigate the advantages of the new *Thermalite* overload indicator now available in Allis-Chalmers transformers. This simple, reliable device will:

1. Offer a continuous visual load check that may be conducted from your service truck.
2. Locate transformers carrying high loads; eliminate extensive and costly area surveys.
3. Provide a visual check on transformers in hard-to-get-at locations.

Thermalite overload indicator lights up brilliantly in response to high oil temperatures — and remains lighted during the overloaded conditions until reset manually with the convenient reset handle. Though the signal device locates overloaded transformers visually, it *does not interrupt service.* It's quiet in operation, low in cost . . . and is engineered, calibrated and installed in the transformer at the factory.

You'll find that the *Thermalite* overload indicator will offer economies never before possible. You will be able to keep more up-to-date records on transformer performance — permitting you to schedule transformer replacements or load rearrangements during daylight hours. It will help to eliminate emergency service interruptions, costly maintenance and possible burnouts.

For more facts and a demonstration of its operating principle, call your nearby Allis-Chalmers district office. Or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

Thermalite is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Allis-Chalmers
Milwaukee 1, Wisconsin
Please send me:

- ☐ Technical Sheet No. S7764
- ☐ Reprint of article "Heavier Transformer Loading Is Feasible."

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strand is a controlled material

your steel allotment for guy strand will go 3 times as far with

PLP GUY-GRIPS

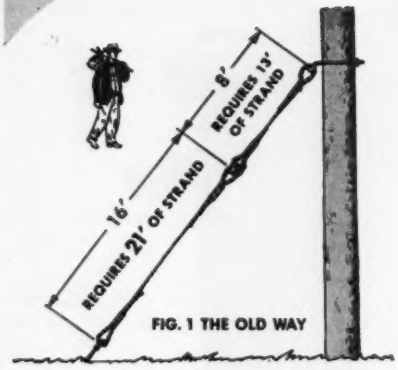

FIG. 1 THE OLD WAY

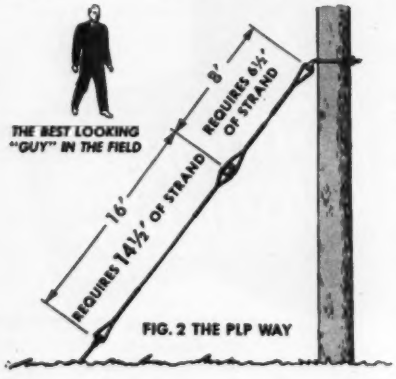

FIG. 2 THE PLP WAY

● With PLP GUY-GRIPS, you save critical guy strand and get stronger, safer guys. *For example,* let's consider the 24-foot, 6000# guy (Fig. 1). Doing the job in this conventional way, using Siemens-Martin Strand, requires:

13′ of ⅜″ strand (TS 6950#)
weighing 273#/1000′ = 3.549 lbs.

21′ of ⅜″ strand (TS 6950#)
weighing 273#/1000′ = 5.733 lbs.

9.282 lbs.

But the equivalent PLP Guy-Grip installation (Fig. 2) using 3-wire Extra-High Strength strand, requires only:

6½′ of ¼″ EHS strand (TS 6600#)
weighing 116.7#/1000′ = 0.759 lbs.

14½′ of ¼″ EHS strand (TS 6600#)
weighing 116.7#/1000′ = 1.692 lbs.

2.451 lbs.

SAVING---6.831 lbs.

Making this Guy the PLP way results in a saving of 73% of critical guy strand . . . and you eliminate the need of any clamps.

With PLP Guy-Grips, even wrenches are not needed. Simply install by hand! (Fig. 4). Any lineman . . . regardless of his skill . . . can do a perfect job every time. *Installation time is cut in half.*

Substantial dollar savings are the result even with "B" and "C" coated strand.

PLP Guy-Grips are available for strand sizes from 1/4" through 1/2".

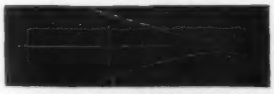

FIG. 3—PLP Guy-Grips consist of Preformed Armor Rods preassembled in Guy-Grip sets.

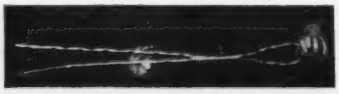

FIG. 4—To install, simply pass through guy-strain insulator or "through-bolt" and rotate ends around guy strand . . . by hand.

FIG. 5—PLP Guy-Grips assure the same tight gripping action as in the case of splices.

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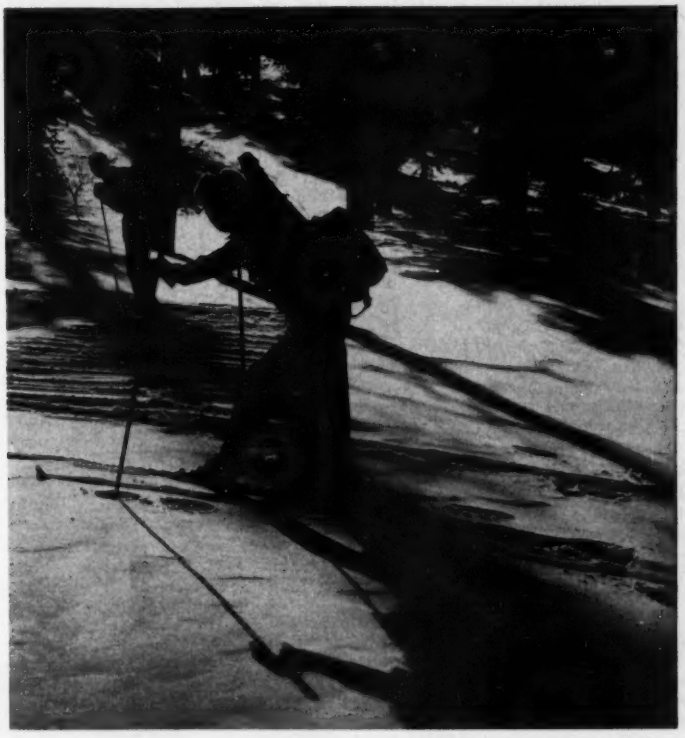
MAY 1952 Vol. 108, No. 5

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

Water Water Everywhere



R. A. Work
Senior Irrigation Engineer,
Soil Conservation Service, Medford

Clyde E. Houston
Irrigation Engineer,
Soil Conservation Service, Reno

Runoff prospects for hydro power generation and irrigation are very bright throughout nearly all of the West. Snow accumulations in mountainous parts of the West, as of April 1, according to U. S. Soil Conservation Service* are above normal nearly everywhere; in fact, are the greatest ever recorded since snow surveys began on many snow courses in California, Nevada, Oregon, Idaho, Utah, Colorado, Arizona and New Mexico.

Because of potential flood threat created by such heavy mountain snows, special snow surveys are being conducted this year at two-week intervals in critical areas throughout the West between April 15 and June 15, as an emergency means of keeping a closer check on mountain snow conditions. Under present conditions, however, it appears urgent that accurate tab be kept on subsequent snowfall and snow melt. Weather conditions between April 10 and June 15 will determine whether the snow leaves the mountains in an orderly fashion, or whether it leaves quickly in sufficient volume to cause flood damage.

In the following paragraphs the water supply network is reviewed state by state. Two charts illustrate graphically reservoir storage and expected stream runoff.

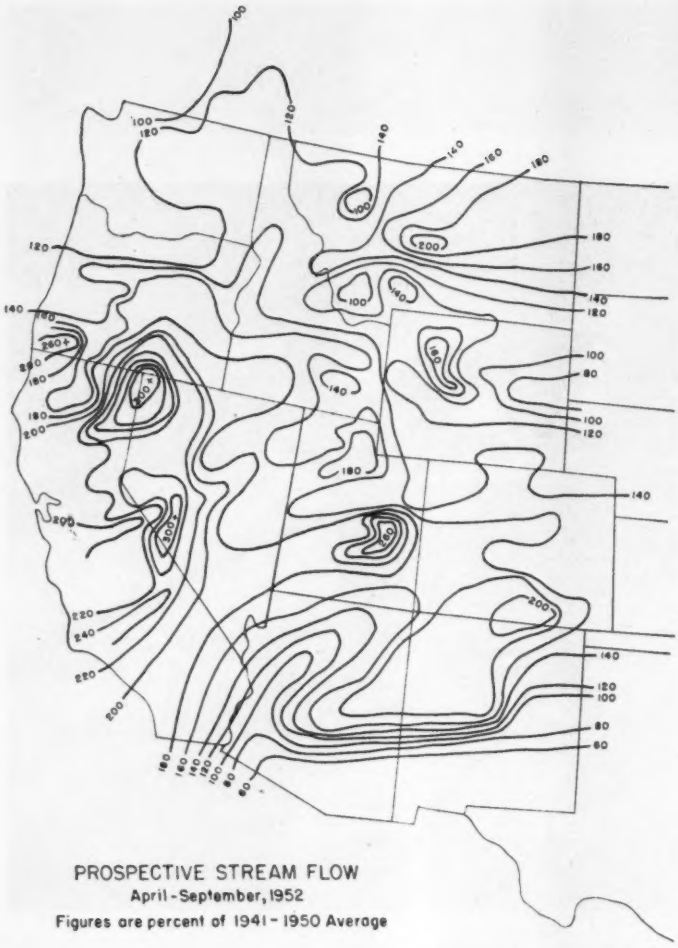
Arizona—Prospects for runoff into the reservoirs of the Salt and Verde Rivers are the best in the past 10 years. The watersheds of these rivers now store more water in snow than in any previous year of record. Soils on these watersheds are saturated.

The Verde River reservoirs should fill and spill before the middle of April. By the end of May an additional 150,000 acre-ft will flow past the gaging station at Horseshoe Dam on the Verde.

It is forecast that for April-June, inclusive, 500,000 acre-ft of water will pass the gaging station at Roosevelt Dam. This should bring the reservoirs of the Salt River to nearly 90% capacity. With favorable weather conditions, it is possible that these reservoirs may fill.

The outlook for runoff on the Gila River is not nearly as bright as on the other watersheds of the state. San Carlos reservoir on April 1 stored water only to about 13% of capacity. Runoff may bring this storage to no higher than 15% of capacity. Soil

* The Division of Irrigation Engineering and Water Conservation is the federal coordinating agency of snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Forest Service, National Park Service, Geological Survey, various departments of the several Western States, irrigation districts, power companies and others. The California State Division of Water Resources conducts and coordinates snow surveys in that state, while the British Columbia Department of Lands and Forests, Water Rights Branch, has charge of the snow surveys in that province.



PROSPECTIVE STREAM FLOW
April-September, 1952
Figures are percent of 1941-1950 Average

moisture conditions are good on the Gila watershed but there is not sufficient snow cover to insure a good runoff.

Runoff into the Little Colorado will be considerably above normal.

Storage in Carl Pleasant Dam was at 75% of capacity, or about 136,000 acre-ft on April 1. It is possible that runoff may bring this storage to maximum of 150,000 acre-ft. Current irrigation requirements are keeping the storage down. Excluding San Carlos reservoir on the Gila River system, the state will enter the irrigation season with all reservoirs at or near capacity.

California—Runoff from snow melt in California, as indicated from April 1 snow surveys, will be the greatest since snow surveys began 22 years ago. Only on the watershed above Shasta Dam, among the major watersheds tributary to Sacramento Valley, is the forecast for less than the 1938 April through July flow. Runoff from the upper Sacramento River watershed is expected to be about 92% of 1938.

On watersheds draining west from the central Sierra (Feather, Yuba and American Rivers) April-July runoff is expected to be the greatest since 1890.

Sierra streams tributary to the San Joaquin Valley may produce flows that will cause local flooding of low-lying agricultural lands in the vicinity of their confluence with the main stem of the San Joaquin River.

On the extreme southern watersheds of the Sierra, indicated runoff will be of such proportions that Buena Vista Lake and Tulare Lake basins will be flooded to approximately the same extent as in 1938. However, it is understood that as much as 300,000 acre-ft of space may be made available in partially completed Pine Flat reservoir upstream on King's River. If this should prove the case, in-flow to Tulare Lake could be materially reduced.

All major reservoirs fed by Sierra streams are expected to fill before the end of the snow runoff period, even though some have been materially lowered in anticipation of large inflows to come.

All of the above predictions, in common with those for other states, are predicted upon assumption of near-normal temperatures and precipitation during the April-July period.

Colorado—Water content of mountain snow on April 1, 1952, on 90% of the courses exceeds all previous measurements since snow surveys were started in 1936. The summer flow of all streams will be much above normal. The flow of most streams will be higher than for any year since 1936 and the flow of some may set new records. These unusually high flows are expected from the Rio Grande in Colorado, and on the San Juan and Dolores Rivers in southwestern Colorado. The flow of all Colorado River tributaries in Colorado will probably exceed the last highest year, which was 1941. The flow of the South Platte, Arkansas and their tributaries will be as high as for any year in the past ten and may exceed this record if rainfall of normal or greater proportions occurs before or during the snow melt season.

Storage in irrigation reservoirs on the South Platte system is well above average. On the Lower South Platte, irrigation reservoirs are near capacity. On the Arkansas and Rio Grande drainages, storage in irrigation reservoirs is much below average and in many cases reservoirs are almost empty.

Soil moisture conditions over the state are good except in the Arkansas River Valley where soil moisture is fair to poor.

Idaho—All watersheds in Idaho have a heavy snow peak, which assures excellent water supplies for irrigation and power generation within the state.

Snow at both high and low levels is well above average. Cool temperatures that have prevailed to date have prevented melt of all but snow at the very lowest elevations. A few weeks more of cool weather could result in serious high water potentials on the Big Wood, Boise, Big Lost, Payette, Weiser, and Kootenai Rivers. Heavy volume flows are forecast on these rivers assuming normal melt conditions throughout the snow melt sea-

son. Several reservoirs have been lowered for maximum use in flood control.

Montana—April 1 snow measurements made over the Upper Missouri and Upper Columbia River basins generally indicate a very good water supply for irrigation this coming season. Snow cover of the Upper Columbia basin in Montana is appreciably above average even though the snow accumulation during March was below average.

However, on the Sun River basin the water content of the snow is just slightly below normal, although not enough to promise any serious shortage of later runoff.

Snow cover on the Upper Missouri River is about 140% of the past 16-year average.

Reservoir storage throughout Montana is very satisfactory.

Nevada—Snow stored water is greater than ever before measured on most of the courses in Nevada. High elevation snow throughout the state is about twice normal, while low snow ranges from three to four times normal.

October through March streamflow along the Humboldt and eastern Sierra is near normal. In these areas ground water levels are normal or above.

Summer streamflow forecasts throughout the state range from a minimum of 140% of normal to a maximum of 307%.

Reservoir storage on April 1 was about 60% of capacity and 90% of the past ten-year average. Storage in eastern Sierra reservoirs is being decreased to furnish a cushion for the expected high summer flow.

New Mexico—Snow accumulation in northern New Mexico is very high near the Colorado-New Mexico line. The amount of snow in respect to normal decreases rapidly to the south. Near Santa Fe and to the west in the Jemez Mountains the snow cover is near normal. Summer stream flow will follow the same general pattern. All Rio Grande reservoirs are practically empty. Residual storage in Elephant Butte reservoir at the end of the coming irrigation season probably will be less than one-half capacity. Soil moisture conditions in valley areas are reported as fair to poor.

Because of the relatively high flow expected for the Rio Grande and its tributaries in San Luis Valley, the probability of extensive flood damage there is rather high. This is particularly true on the Conejos River where some flood damage occurs almost every year.

In view of the preparations that have been made to control the flow of the Rio Grande at Albuquerque, the probability of extreme flood damage will depend upon the strength of the levees. In other less well protected areas along the Rio Grande, damage may be expected.

Water content of snow is measured by weighing core in hollow tube on special scales

Oregon—Water supplies for 1952, based on mountain snows, should be abundant as state-wide snow cover is 168% average. Snow cover below 5,000 ft is even greater in relation to average than the higher level snows. Streamflow for the April-September period should break many historical records on the following drainages:

Owyhee, John Day, Harney Basin, Deschutes, Crooked, North Umpqua, main Rogue, Applegate, Illinois, Williamson, Sprague, Deep Creek and Chewaucan Rivers.

Extremes of high water with some record-breaking flows have already been received in many areas but the potential hazard remaining in the present snow cover is great and under adverse melting conditions could easily produce damaging flows in any of the above drainages.

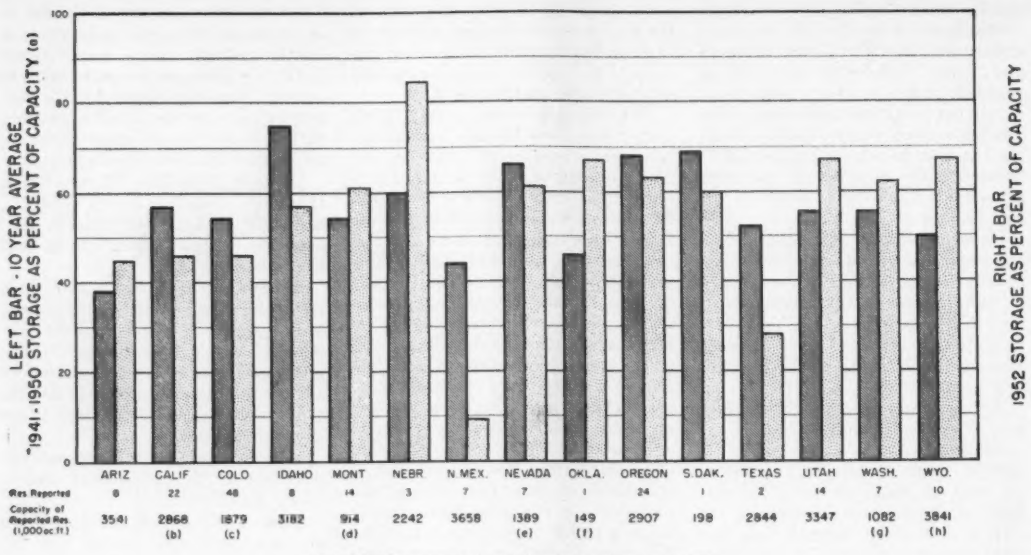
Reservoir storage has improved considerably in the past month and is now satisfactory.

Utah—All parts of the state have an excellent water supply for the coming summer in snow storage on mountain watersheds. Forecast runoff expressed as a per cent of the April-September ten-year (1941-50) average varies from 125% of normal on Ashley Creek in the Uintah basin to 257% on the Price River. Since 55 of 69 snow courses having long-time records have equaled or considerably exceeded previous record water content measurements, the great volume of snow water can be expected to produce record or near record peak flows on nearly all streams, with considerable damage to farmlands, homes and other structures in vulnerable areas. Where possible, reservoir storage is being reduced to allow a cushion for peak flows.

Reservoir storage varies considerably over the state. The reservoirs of the Weber-Ogden system held only 16% of capacity, having been drawn down so that they can reduce peak streamflow. In the Sevier and Beaver River reservoirs, storage is 42% of capacity and 52% of the ten-year average, reflecting the low water supplies of the last two years.

Average for all reservoirs in the state is 69% of capacity and 124% of the ten-year average.

Washington—Water supply forecasts in Washington are good to excellent for the 1952 season. Relatively heavy volume flows are expected on the Lower Columbia, Spokane, and Okanogan Rivers. If these large volumes remain in the mountains until late in the snow melt season, damaging high water could result then from a rapid snow melt.


LEFT BAR - 10 YEAR AVERAGE
1941-1950 STORAGE AS PERCENT OF CAPACITY (a)
RIGHT BAR
1952 STORAGE AS PERCENT OF CAPACITY
100
80
60
40
20
0
ARIZ CALIF COLO IDAHO MONT NEBR N.MEX. NEVADA OKLA. OREGON S.DAK. TEXAS UTAH WASH. WYO.
Res Reported 8 22 48 8 14 3 7 7 1 24 1 2 14 7 10
Capacity of Reported Res. (1,000 ac ft) 3541 2868 (b) 1879 (c) 3182 914 (d) 2242 3658 1389 (e) 149 (f) 2907 198 2844 3347 1082 (g) 3841 (h)

RESERVOIR STORAGE AS OF APRIL 1, 1952

Explanation: (a) Most state averages for reported reservoirs are for full 10-year period, but in a few cases reservoirs having shorter records are included. (b) Does not include Millerton or Shasta reservoirs (combined capacity 5,020,500 acre-ft); April 1 combined storage 4,243,400 acre-ft. (c) Does not include John Martin reservoir (capacity 685,000 acre-ft); April 1 storage 46,000 acre-ft. (d) Does not include Fort Peck reservoir (capacity 19,000,000 acre-ft); April 1 storage 12,390,000 acre-ft. Does not include Flathead Lake (capacity 1,791,000 acre-ft); nor Hungry Horse reservoir which stored 68,080 acre-ft on April 1 and will store up to 1,000,000 acre-ft this spring. April 1 storage 572,300 acre-ft. (e) Does not include Lake Mead (capacity 27,217,000 acre-ft); April 1 storage 15,691,000 acre-ft. (f) New reservoir 1945. (g) Does not include Roosevelt Lake (capacity 5,220,000 acre-ft); April 1 storage 1,700,000 acre-ft.

The water stored in snow on the mountains in British Columbia, which furnishes nearly half the water to the main stem of Columbia River, ranges up to 125% of normal on the East Okanogan. The remainder of Columbia basin in the United States has a heavy snow pack, which will contribute to high runoff. The combination of heavy fall precipitation and snow stored water are higher as of April 1 than in any other year of the 17-year period of snow recorded.

Wyoming—The snow water stored in the high watersheds of western Wyoming varies from 26 to 46% above average. An excellent water supply is forecast for the Jackson Hole area and adjacent irrigated land in Idaho. The possibility of damaging high water in the Jackson bottoms if the snow melt runoff is delayed cannot be overlooked.

Snow water measured on the Green River watershed was slightly above normal and is probably the least above normal snow cover in the Rocky Mountain area.

Summer runoff of North Platte River will be very high. April-September flow of the North Platte at Saratoga will probably exceed 1,000,000 acre-ft. Because the available capacity of the North Platte reservoir system as of this date is about one-half of this amount, the whole system probably will spill this year for the first time since the system was completed. The flow of the Laramie River will also be high. Soil moisture conditions on the irrigated areas of the North Platte in eastern Wyoming and western Nebraska are good.

Snow cover on Wind River basin in Wyoming averages slightly below normal. Water supplied from this basin is not expected to be as great as during the past two years, but should not be much below normal.

British Columbia—Snow surveys in British Columbia indicate that to date little early melting has taken place except at the lower elevations in the southern and central portions of the province. Most observers report low- to medium-density snow, which indicates that the snow has not ripened appreciably in preparation for the spring thaw. This applies particularly to snow packs above the 3,000 ft level. The snow line varies from 1,000 ft elevation in the lower coastal area to 2,000 ft in the southern Okanogan and Columbia.

The weather during the past month has been generally mild with cool nights and valley precipitation, reported by key stations of the Meteorological Service of Canada, generally below normal.

The over-all snow situation this year throughout the province is rather mixed. Snow is considerably less than measured in 1950 and 1951. Above normal snow packs on the West Kootenay, Columbia, Okanogan and North Thompson should contribute to an above-normal runoff if normal or above-normal temperature and precipitation prevail until and during the runoff period. For similar conditions of weather the runoff in the West Kootenay, Skagit and Similkameen areas should be slightly below normal.

However, all areas report at least equal or greater snow-water content than in 1948. The possibility of flooding cannot be ignored and will depend upon the temperature and precipitation distribution during the snow melt season. The watershed soils in all areas are well primed for runoff.

There is little information available as of this date concerning reservoir storage in British Columbia, but it is known that Okanogan Lake elevation is 99.1, the lowest for many years.

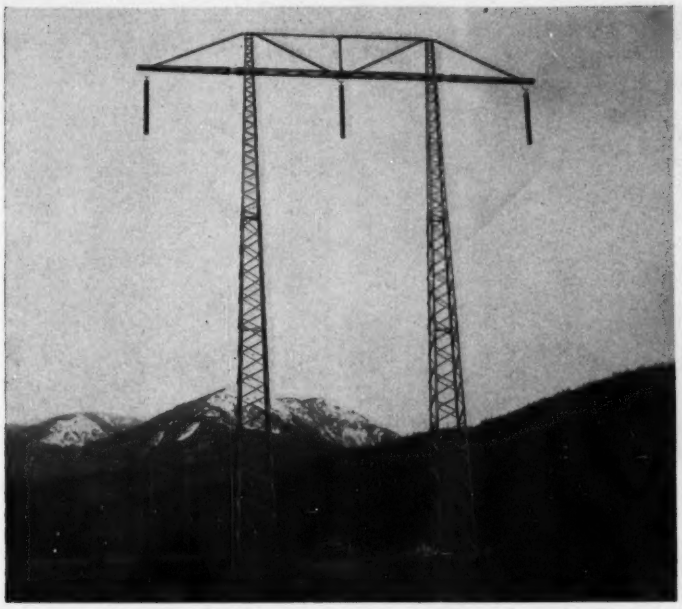


Fig. 1—345-kv tangent section tower ready for stringing 795,000-cir mil ACSR conductor

B. C. Electric Pioneers 345-kv Transmission

T. Ingledow

Vice-president and Chief Engineer
B. C. Electric Co., Vancouver, B. C.

Having read the article "Bonneville Will Transmit at 345 Kv" in the March issue of ELECTRICAL WEST, I am prompted to further this discussion in view of developments in high-voltage transmission, which this company is carrying out.

The ever-increasing need for transmitting large blocks of power from increasingly remote generating stations to the load centers has been a matter of concern to many utility operators during the past several years. Higher and higher costs of manpower and materials together with the increasing degree of congestion in territories that transmission lines must traverse adjacent to the load centers is focusing attention of the utility industry on the transmission needs of the future.

In the case of this company, the B. C. Electric Co. Ltd., hydro plant capacity in operation or under construction on the mainland system is presently in excess of 600,000 hp. With present rate of growth, the load is doubling every eight or ten years. In 20 years, at this rate, additional capacity of the order of 2,000,000 hp might be required for system needs. Potential hydro sites involving upwards of 3,000,000 hp are located within 200 to 300 miles of Vancouver.

The industry is faced with heavy costs for expansion at this time and the matter of economy is more than ever of paramount importance. While in the article above mentioned reference is made to "an operable scheme at minimum cost" and also "the need that only through continuous research and application of new developments

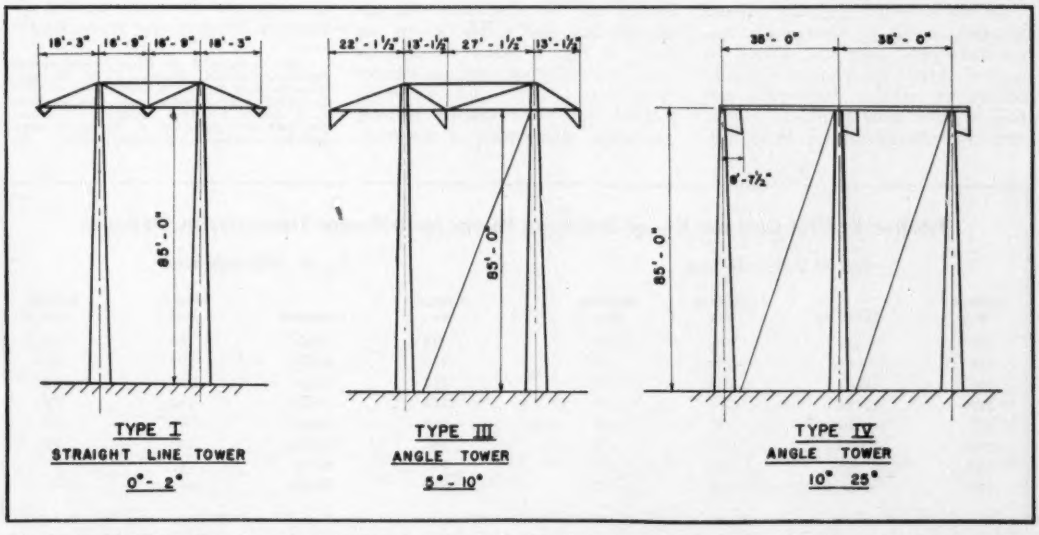
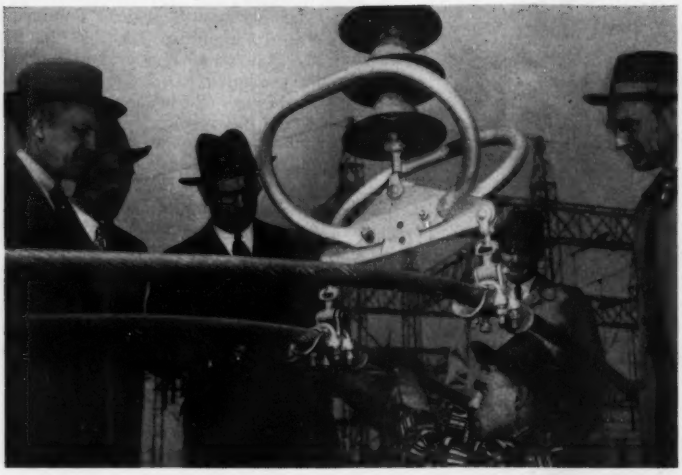
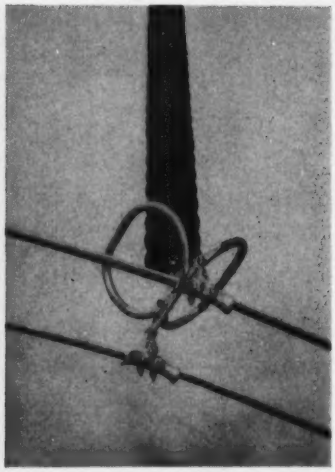


Fig. 2—Straight line and angle steel tower dimensions for B. C. Electric Co.'s 345-kv line. Sixty-five miles of line are being built





Figs. 3-4—Suspension assembly showing grading ring, suspension yoke, preformed armor rods for twin 795,000-cir mil ACSR conductor*

can the administration bring the benefits of the low-cost hydroelectric energy to all the consumers in the Pacific Northwest," I should like to point out that the privately owned utilities throughout the country, Canada as well as the United States, have been faced with the necessity for the utmost economy for many years. They have found it absolutely essential to obtain the highest degree of efficiency possible in order to offset to some extent at least the great inequity that exists today in the over-all financial responsibilities of privately managed utilities as against government owned and operated utilities.

In line with this need for strictest economy, the B. C. Electric Co. has, ror some years past, been giving extensive study to the question of higher voltage transmission. During the past two or three years European experience and practices have been fully investigated. The research carried out there leading to the use of higher voltages, as well as that along similar lines in eastern United States, has been carefully studied and analyzed. The end result of this has led to the decision by my company that our main transmission system of the future must be in this higher range of voltage. Therefore, 345 kv has been selected and 65 miles of line are now being constructed for eventual operation at this voltage, the line being planned for ultimate extension to over 200 miles.

A photograph of one of the recently constructed towers is shown in Fig. 1. Details of the clearances for the straight line and angle towers are given in Fig. 2. After considerable study, the twin conductor was selected rather than a single conductor of expanded type. The spacing between conductors and details of the hardware are shown in the accompanying photographs, Figs. 3 and 4.

Initially, one conductor only is being installed for 230-kv operation but the ultimate insulation involving 21 25,000-lb insulator units per string is being installed from the outset. Fig. 5 shows the timber grillage and details of the steel tower base construction.

Figs. 6, 7, 8 and 9 show the results of studies on which the choice of voltage was based. Figs. 6 and 8 refer to a 200-mile length of fine and 7 and 9 to a 300-mile length of line. These line lengths represent the approximate upper and lower limits for lines to meet our future requirements. It will be noted that for a transmission distance of 200 miles the 345-kv double-

* Left to right: J. P. Fraser, assistant chief engineer, electrical division; F. O. Wollaston, superintendent of design, engineering division; T. Ingledow, vice-president and chief engineer; J. H. Steede, executive assistant to vice-president and chief engineer; H. W. Smith, assistant chief engineer, engineering division.

Relative Capital Cost per Kw of Delivered Power for Different Transmission Voltages

Fig. 6, 200-mile Line

Voltage Kv	Conductor	Loading MW	Relative Cost
230	single	172	1.00
230	double	224	.97
287	single	268	.83
287	double	348	.76
345	single	387	.77
345	double	503	.70
380	single	469	.79
380	double	610	.72

Fig. 7, 300-mile Line

Voltage Kv	Conductor	Loading MW	Relative Cost
230	single	132	1.00
230	double	172	.97
287	single	206	.80
287	double	268	.73
345	single	298	.70
345	double	387	.65
380	single	361	.71
380	double	469	.64

Figs. 6-7—Results of studies on which choice of transmission voltages was based. The line lengths used were for 200 and 300 miles

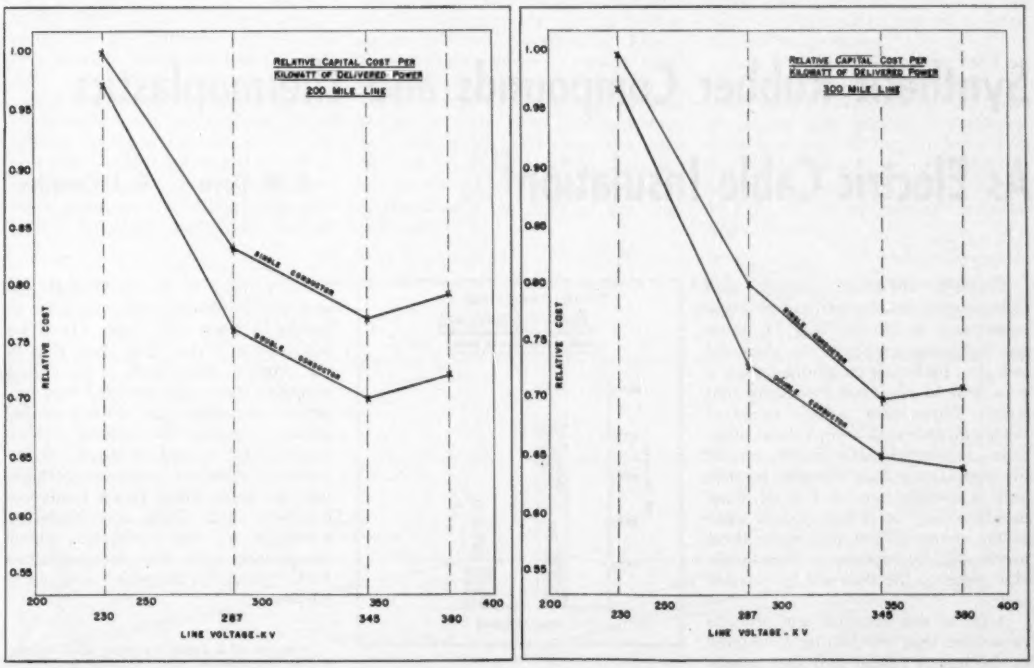
Fig. 5—Standard 345-kv steel tower foundation showing timber grillage and assembly jig

conductor line proves the most economical, while for a distance of 300 miles the 380-kv double-conductor line is the lowest by a small margin. The 345-kv line, however, very closely approximates the economy with the 380-kv line at 300 miles. For this reason, and also for the reason that terminal equipment can be obtained for a 345-kv system in the relatively near future, the 345-kv transmission line was accepted as being the most suitable for conditions in this territory.

The basic system assumed for these studies was a line transmitting power from a remote hydroelectric plant to a substation in the load area receiving power at a 230-kv bus. For transmission voltages above 230 kv suitable autotransformers were assumed at the receiving end while at the generating end the voltage was stepped up directly from generator voltage.

A right-of-way sufficiently wide for three such lines is currently being acquired throughout the present line length, that is, from Vancouver to a point approximately 15 miles east of Chilliwack. The latter is the site of the new Wahleach generating plant scheduled for operation late this year. The advantages of parallel line operation with one or two intermediate switching points have been taken into consideration for future development of maximum line loading and for the condition of maximum power transmission with one section out of service. Use of 230 kv with capacitor compensation has been discarded because we believe that such a method can be makeshift only in the long-term future.

Notwithstanding the possibilities of usable energy for domestic, commercial and industrial requirements sometime in the future being derived from sources other than the presently established ones, we believe it safe to assume that hydroelectric power, particularly in this area, can remain an economic source of supply for some decades to come.



Figs. 8-9—Like Figs. 6 and 7, these graphs show relative capital cost per kw of delivered electric power for 200- and 300-mile line

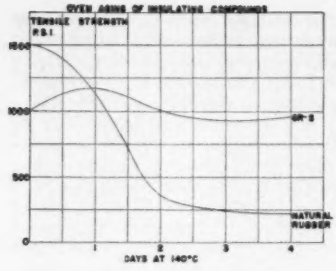


Fig. 1

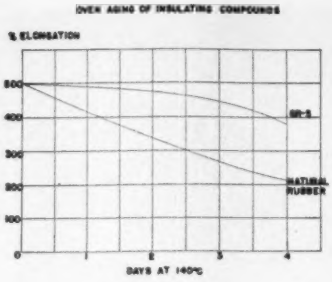


Fig. 2

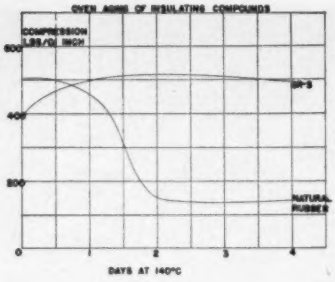


Fig. 3

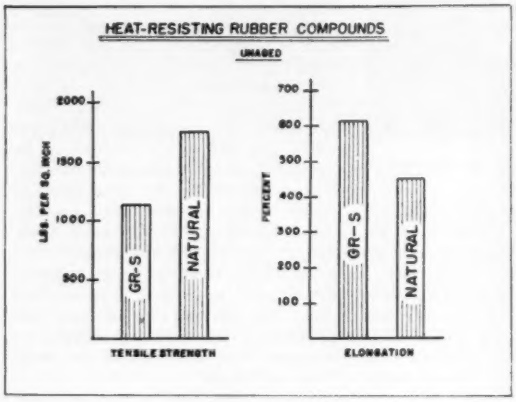


Fig. 4

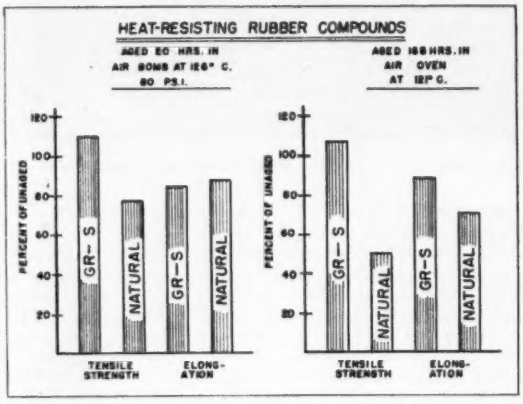


Fig. 5

Synthetic Rubber Compounds and Thermoplastics As Electric Cable Insulation*

E. W. Davis — Director of Engineering
G. J. Crowdes — Chief Engineer
Simplex Wire & Cable Co.

Through chemical research and technological developments during and subsequent to World War II, there has became available to the electrical industry, including communications, a new field of electrical insulating materials. These offer a wide range of electrical, chemical and physical properties consistent with longer service life expectancy than thought possible only a decade ago. A few of these materials will be discussed, and some of the characteristics that make them predominately superior to those available prior to the war will be pointed out.

A list of the electrical and physical properties that need to be considered in the use of rubber and thermoplastics in wire and cable are shown in Table I. Prior to World War II, the common insulating materials were as shown in Table II. Table III is an extension of Table II to show that to the original three types of insulating materials there can be added very important materials that bid fair to displace generally the natural rubber compounds, to replace much of the varnished cambric, and even encroach into the fields where paper insulation has been used. These new insulating materials are the synthetic rubber compounds and the thermoplastics PVC (polyvinyl chloride) and polyethylene.

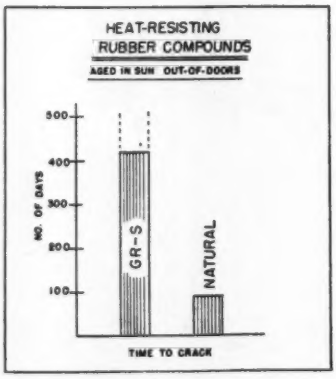


Fig. 6

* Abstract of a paper presented at a meeting of the Engineering and Operation section of the Pacific Coast Electrical Assn., held at Fresno, Calif., March 20-21, 1952.

Table I

Properties of Rubber or Thermoplastic Material for Wire and Cable

Electrical

Dielectric strength
(impulse, short and long time)
Specific inductive capacity
(dielectric constant)
Specific resistivity
(insulation resistance)
Power factor
(dielectric loss)

Physical

Tensile strength
Elongation
Compression resistance (cold flow)
Abrasion resistance
Tear

Chemical

Mechanical water absorption
(and electrical stability)
Resistance to heat
Alkalies
Acids
Oils
Oxygen
Ozone and corona
Other chemicals
Sunlight

Table II

Common Insulating Materials Prior to World War II

1. **Natural Rubber Compounds**
   Code
   Performance
   Heat resisting
   Ozone resisting
   Low S.I.C.
   Submarine
   Tough sheath compounds
2. **Varnished Cambric**
3. **Paper**
   Dry for communication cables
   Impregnated for power cables

Table III

Available Insulating Materials Subsequent to World War II

1. **Natural Rubber Compounds**
   Performance
   Heat resisting
   Ozone resisting
   Low S.I.C.
   Submarine
   Tough sheath compounds
2. **Synthetic Rubber Compounds**
   GR-S
   Butyl
   Neoprene
   Code
   Performance
   Heat resisting
   Ozone resisting
   Low S.I.C.
   Submarine
   Tough sheath compounds
3. **Varnished Cambric**
4. **Thermoplastics**
   Polyvinyl Chloride and Copolymers
   Polyethylene
   Moisture resisting
   Low temperatures
   High temperatures
5. **Paper**
   Dry for communication cables
   Impregnated for power cables

The synthetic rubber insulating compounds and the thermoplastics that are listed in Table IV are distinctly developments during and subsequent to the last war and are the only modern materials here considered.

It was soon evident that insulating compounds could be produced using suitable synthetic rubbers, which not only had adequate electrical and physical properties of similar compounds made with natural rubber, but also were more stable under the various environments to which an electric cable is subjected, such as heat, light, moisture, oxidation and ozone. Some of these comparative test data will serve to bring this out clearly.

Natural and Synthetic Rubbers Compared

Figs. 1, 2 and 3 show the deterioration of the heat-resistant or superaging grade of rubber insulations made with natural rubber and one of the most commonly used synthetic rubbers (GR-S) during a reasonably severe accelerated aging at 140 C.

It should be noted that while the initial tensile strength and compression resistance of the natural rubber compound are considerably higher than for the synthetic rubber type, this relative comparison changes in less than one day at the accelerated test temperature. After four days these two essential physical properties show little or no change, while those for the natural rubber compound are only approximately one-third of the original value.

Figs. 4 and 5 show like data for these same compounds prior to and after a similar aging test at a different test temperature.

Fig. 6 shows the relative light resistance of insulating compounds made with the two types of rubber under discussion. The greater resistance to light checking of the synthetic rubber compound is of prime importance where such insulation may be exposed to light as, for instance, at terminations of cable.

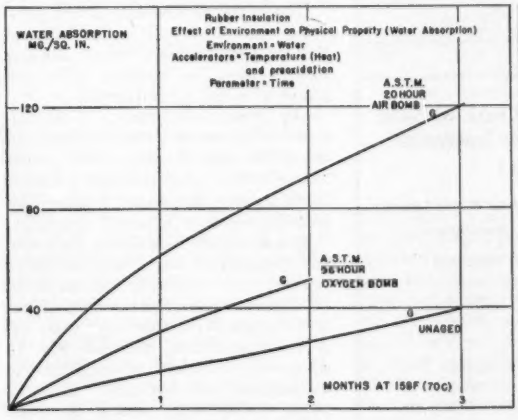


Fig. 7

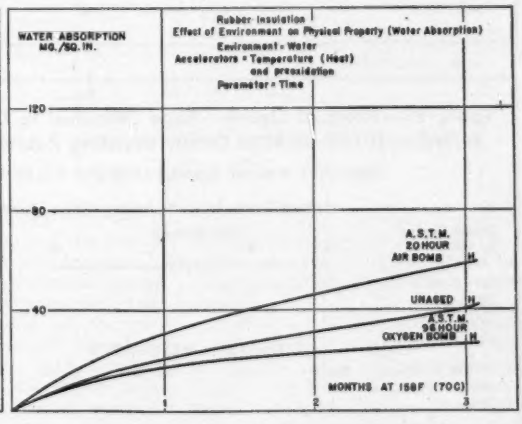


Fig. 8

Table IV—Properties of Polyethylene for Power Work

Property	Characteristics	Remarks	Suitability for Power Work: Favorable	Unfavorable
Dielectric strength	High		x	
Dielectric constant	Low		x	
Power factor	Low		x	
Insulation resistance	High		x	
Tensile	High		x	
Elongation	High		x	
Oxidation and heat	Excellent	— if protected by antioxidant	x	
Water	Excellent	— nearly perfect	x	
Oil	Good		x	
Corona	Poor	— damaged by discharge		x
Ozone	Good		x	
Acids and alkalies	Excellent		x	
Flame	Poor	— can be made flameproof but not for insulation		x
Sunlight	Good	— if protected by addition of pigment and antioxidant	x	
Deformation	Good	— up to 190 F liquid at 230 F	x	
Cracking	Excellent	— with cold	x	
Shattering	Good	— with cold	x	
Arc resistance	Poor			x
Tracking	Poor	— from arc or failure		x
Coefficient of expansion	High	— about 3 times that of rubber		x

Table V—Properties of P.V.C. for Power Work

Property	Characteristics	Remarks	Suitability for Power Work: Favorable	Unfavorable
Dielectric strength	High		x	
Dielectric constant	High			x
Power factor	High			x
Insulation resistance	Fair	— good enough	x	
Tensile strength	High		x	
Elongation	Fair		x	
Oxidation and heat	Good		x	
Water	Excellent	— if so compounded	x	
Oil	Good		x	
Corona	Good		x	
Ozone	Excellent		x	
Acids and alkalies	Good		x	
Flame	Good		x	
Sunlight	Excellent		x	
Deformation	Fair	— when heated		x
Cracking	Fair	— when cold		x
Shattering	Poor	— when cold		x
Arc resistance	Good		x	
Tracking	Good	— from arc or failure	x	

Table VI—Effect of Ozone—Time (Minutes) to Crack or Split 6-Strd.—10/64-in. Wall Ozone-Resisting Rubber Insulation

(Samples wound around mandrel 4 x O.D.)

Ozone Concen. by vol.	Natural Rubber Ozone Resistant Compd. Manufacturer A	B	C	D	Synthetic Rubber Compd. Manufacturer E
	Time in Minutes				(Minutes)
.010% to .015%	15	180+	180+	10	600+
.04%	5	5	90	5	600+
.2%	1	10	5	3	400+
	After 7 Days at 250 F (121 C)				
.010% to .015%	Brittle	Brittle	Brittle	Brittle	300+
.04%	"	"	"	"	300+
.2%	"	"	"	"	300+

Figs. 7 and 8 provide information on the effect on the water absorption of two rubber insulations in an environment of water plus temperature acceleration with additional acceleration provided by preoxidation of the insulations. One insulation G (Fig. 7) is natural rubber and is greatly affected, the other H (Fig. 8) synthetic rubber (GR-S) is not nearly so much.

Fig. 9 provides comparative test data on the increase in capacitance with water soak at 70 C on two similar compounds, one with natural rubber and the other with GR-S synthetic. Stability of the natural rubber insulation as judged by the effect of aging is much less than for the GR-S insulation.

Tables IV and V list the electrical and physical properties of polyethylene and the ordinary polyvinyl chloride, together with their favorable and unfavorable characteristics for power service.

Thermoplastics

The excellent electrical properties of polyethylene make the use of this material for power cables particularly tempting, but some of the physical characteristics and its susceptibility to contamination have somewhat retarded its use.

The use of the polyvinyl chloride for power work has been generally limited to low-voltage cable, including street lighting cables. The high dielectric constant and high power factor of such compounds to date make the material undesirable for cable to operate at the higher voltages.

The low dielectric constant of polyethylene makes it the best insulating material of the solid type for communication cables. It also is the most stable material electrically when exposed to water.

The dielectric constant of the polyvinyl chloride is not so favorable as that of polyethylene. When properly compounded, its stability when exposed to water is excellent.

Fig. 10 shows the change of capacitance of a communication wire having conductors insulated with an extruded rubber insulation and a similar cable having the same thickness of polyethylene and polyvinyl choride.

It was earlier mentioned that rubber compounds made with synthetic rubbers may encroach into the field of high-voltage cables where paper and varnished cambric have been the accepted insulating materials. Fig. 11 shows the measured power factor vs temperature of varnished cambric, paper (solid type) and a synthetic rubber compound suitable for high-

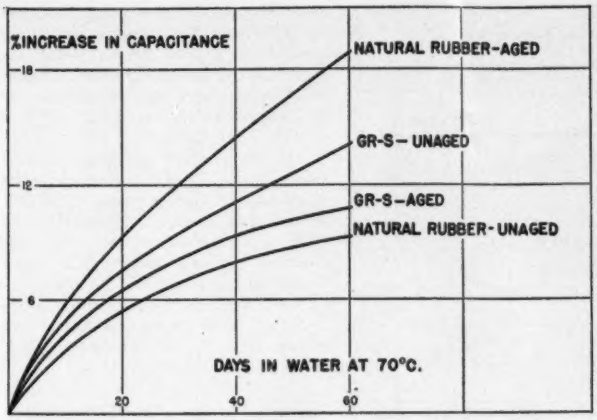


Fig. 9

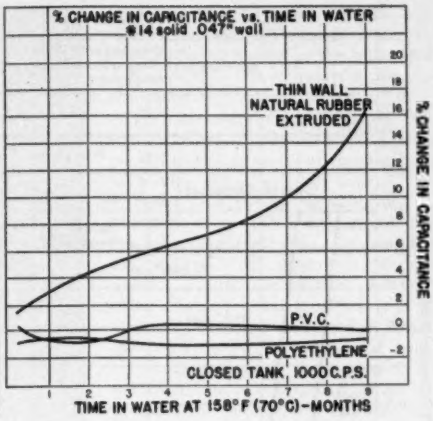

% CHANGE IN CAPACITANCE vs. TIME IN WATER
#14 solid .047" wall
THIN WALL NATURAL RUBBER EXTRUDED
P.V.C.
POLYETHYLENE
CLOSED TANK 1000 C.P.S.
TIME IN WATER AT 158°F (70°C)—MONTHS
% CHANGE IN CAPACITANCE

Fig. 10

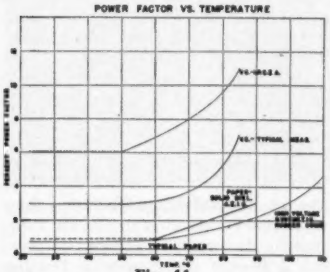


Fig. 11

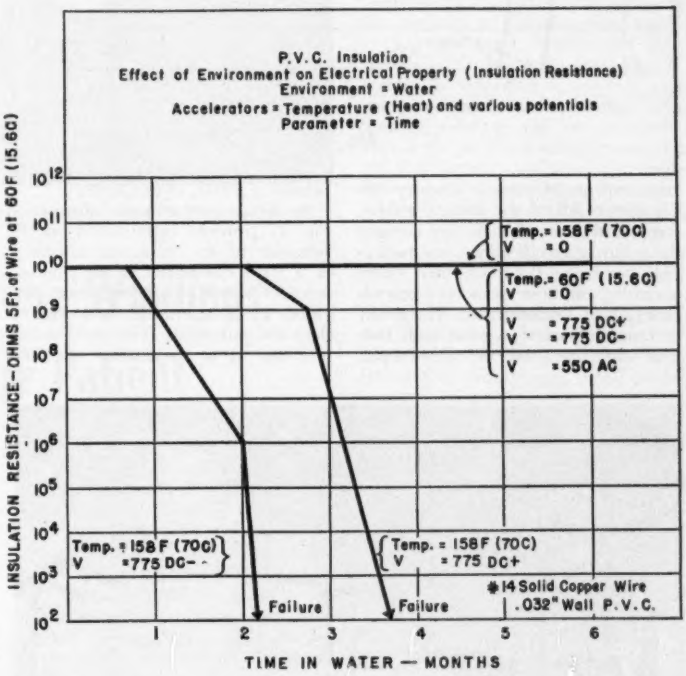

P.V.C. Insulation
Effect of Environment on Electrical Property (Insulation Resistance)
Environment = Water
Accelerators = Temperature (Heat) and various potentials
Parameter = Time
INSULATION RESISTANCE—OHMS 5Ft. of Wire at 60F (15.6C)
Temp. = 158F (70C) V = 0
Temp. = 60F (15.6C) V = 0
V = 775 DC+
V = 775 DC-
V = 550 AC
Temp. = 158F (70C) V = 775 DC-
Temp. = 158F (70C) V = 775 DC+
Failure
Failure
#14 Solid Copper Wire .032" Wall P.V.C.
TIME IN WATER — MONTHS

Fig. 12

voltage cable. Over the entire range of temperatures, the synthetic rubber insulating compound shows a power factor somewhat lower than specified in the AEIC specification. Load cycle tests now in one manufacturer's laboratory indicate the suitability of this synthetic rubber compound for high-voltage cable service and temperatures at least as high as 176 F.

Effect of Aging

Most specifications for rubber insulating compounds have been written around physical and electrical properties of the unaged materials. With the development of the heat resisting or superaging compounds, there appeared in specifications physical properties after some type of accelerated aging procedure. No attention was given to deterioration of electrical properties, ozone resistance or moisture resistance after the accelerated aging test. Experience has shown that deterioration of these properties is of as much if not more importance than the deterioration of the physical properties. Ozone resistance of many natural rubber compounds decreases as the compound ages, and the rate of moisture absorption may increase.

In fact, one cable manufacturer is advocating tests for ozone resistance and the electric stability in the presence of moisture both after some form of aging procedure. With synthetic rubber compounds, this appears to be the next step in an attempt to specify factory test procedures that will assure customers stability of these properties throughout the life expectancy for the cables, particularly where a loss of these properties may result in cable failures.

Table VI shows the effect of aging on the ozone resistance of rubber compounds made with natural and synthetic rubbers. All of these compounds were designed to have high ozone resistance and all meet the ozone

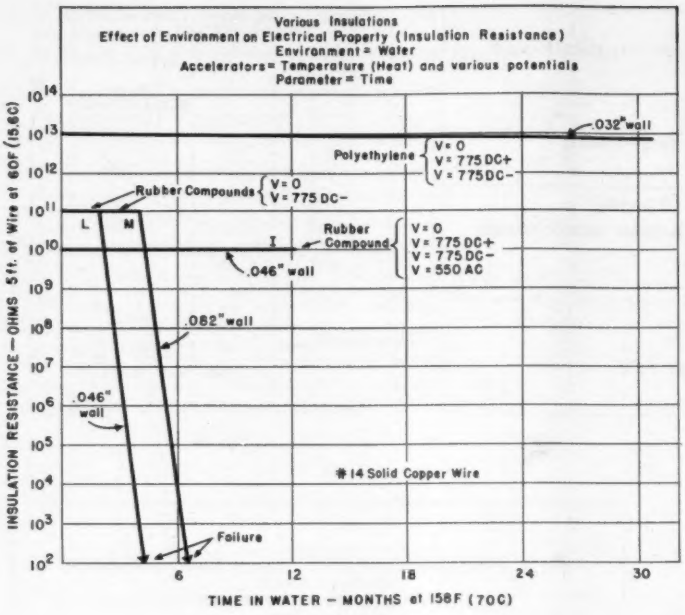


Fig. 13

requirements of current industry specifications. All of the natural rubber compounds, even though they do meet the industry specifications, are susceptible to ozone failures under severe operating conditions as service records clearly have demonstrated. The greater factor of safety against such failures with the synthetic rubber compounds is shown in this table.

As final comparative information Fig. 12 provides information on the behavior of the insulation resistance of a PVC compound in an environment of water plus acceleration provided by temperature and various electrical potentials. The acceleration provided by a temperature of 158 F and d-c negative potential produces early failure. The next most severe condition is that of the same temperature and d-c positive potential. Little effect is provided by temperature itself without voltage or voltage of various kinds with only 60 F temperature.

This chart is an excellent illustration of the rather complex results from various combinations in actual service. For example, a prediction of little effect by d-c negative potential based on the 60 F tests would certainly not be supported by the 158 F results where early failure resulted. Incidentally, these two temperatures are within the commonly given operating range of this insulation.

Fig. 13 is similar information on various insulations all in an environment of water with temperature acceleration to 158 F and various potentials. Polyethylene and rubber compound I (a GR-S submarine type) are quite stable. Rubber compounds L and M (both natural rubber "oil base") need only temperature acceleration to provide electrical failure. Here also is seen an indication that increased insulation thickness may serve as a retardant only.

The foregoing discussion is not an attempt to cover the entire subject of the use of synthetic rubber and thermoplastic compounds in electric cable designs. It is only an attempt to point out a few of the important features that will inevitably result in better service records and greater installed life expectancy than have been experienced in the past.

Mobile Home For Operators

Relief operators whose duties take them away from home for several days at a time are housed by Washington Water Power Co. in a specially constructed mobile unit. Designed to company specifications and built by Novelty Carriage Works of Spokane on an International Metro COE chassis, the vehicle supplies 72 sq ft of living space for the operator during stays of five days each at various substation and generating points. Replacing a Vagabond trailer, the new unit is designed to take local electric service and in addition has connections for service by local water systems at each stop.

Unit is shown here parked at the Lind, Wash., substation, with the old trailer in the background. Charles Schaffner, relief operator, is hooking up to local electric and water lines.

High-voltage d-c test set determines condition of machine insulation. Weighs only 80 lb

Diagnosis of Machine Windings Without Killing the Patient

Diagnosis without killing the patient is the promise held forth by a high-voltage d-c test for determining the condition of the insulation in generators, condensers and other rotating machinery. For years management has been demanding a maintenance test procedure that would clearly indicate when a winding should be replaced, and a test that at the same time would not prematurely puncture a good winding. When rewinds costing up to $50,000 or more are involved, it is natural that great emphasis should be placed upon the type of test to be used.

This problem was the topic of discussion at a recent hydraulic committee meeting of the Pacific Coast Electrical Assn. held at Fresno, Calif. One Western utility was reported to have tested more than 3 million kva of machine capacity by the d-c method. The company is well satisfied and has officially adopted the d-c test.

It was brought out during the discussion that the idea of using a direct current and measuring leakage current through a dielectric is not new. It remained, however, for the development of very sensitive d-c instruments during the war to make a d-c leakage test, beyond the range of instruments available up to that time, practical. Out of radar came the d-c microammeter that will measure down to one microampere.

With this meter it was then comparatively simple to build a test set consisting of a half-wave rectifier that would provide d-c voltages up to 25 kv or higher. Variable a-c in the primary of a step-up transformer is used to vary the d-c voltage output of a rectifier from zero to 25 kv d-c. A d-c voltmeter in series with a very high resistance is calibrated to read directly in kilovolts and indicates d-c test potential applied.

The test set cabinet is about the size of a three-suiter suitcase, weighs only 80 lb. and can be handled easily by one man and placed in the back of a sedan. Such a test is shown in the accompanying photograph.

To make the d-c test the high-voltage terminal of the test set is connected to one terminal of the machine and the other to the neutral, or ground. Test voltage first applied is about half the rated voltage of the machine. Sufficient time is allowed for the voltage and current to become stable, or until the machine has become charged because of its capacitance. Voltage is then raised in increments of 1,000 v or less and leakage current through the insulation in microamperes is recorded. As these increments of voltage are applied, the leakage current will plot out to be practically a straight line according to Ohm's law—up to a certain point.

A point is reached, depending upon the condition of the insulation, where the current curve breaks and rises rapidly with increase in applied voltage. It is dangerous to continue the test beyond this upturn in the curve because puncture will occur shortly. This is the factor of safety in the d-c test that prevents damage to a winding and enables management to choose a suitable time for machine outage if rewind is indicated.

A number of dielectric puncture tests, both d-c and a-c, have been made on windings that were to be replaced, so that considerable correlation data between d-c and a-c are now available. From these tests it had been found that the average factor varies between 1.5 and 1.7. That is, the d-c breakdown voltage will be 1.5 to 1.7 times the a-c breakdown voltage.

The high-voltage a-c maintenance test favored by many utility engineers in the past requires a heavy truck load of equipment. Moreover, the a-c test using the generally accepted value of one and a half times the rated voltage of the machine tells only one thing, i.e., whether the winding will withstand this voltage or break down. It is either good or bad and it is impossible to tell how good or how bad.

What utility operators desire is to be able to determine the condition of a winding and its life expectancy and to plot a case history curve from periodic tests. The d-c test permits this to be done just as a doctor can follow the degeneration of the functions of the human body with advancing age by periodic examinations and tests.

The point is that, in the d-c test, management now has something tangible and concrete upon which to make a decision.

Selecting Insulations for Control Cables

A discussion of electrical and physical properties of thermoplastic and rubberlike compound insulations for primary control cables*

E. E. McIlveen
Research Engineer
The Okonite Co.

The selection of an insulation and its coverings for the vital control circuits of a modern generating station, substation or industrial plant presents a complex problem that can be resolved only when the user's experience and the manufacturer's service record on the product are integrated. The responsibility for the choice must, therefore, be shared by both parties. A brief discussion of a few of the many insulations and assemblies offered in the last five years and current methods of evaluating them may be of interest to the designing or operating engineer, particularly in the hard light of experience.

First, take the thermosetting rubber insulating material, that is the vulcanizable compounds in which the plasticity remains relatively constant throughout the cable temperature range. It can be said, with a few notable exceptions, that for each of the half-dozen natural rubber compound classes in existence 10 years ago, there is now at least one GR-S rubber alternate, to say nothing of the varieties because of some 10 different commercially available GR-S synthetic polymers. In addition, butyl rubber has been found to be a useful basic ingredient in the old mineral filler, heat-resisting compound. Blends of butyl with other rubberlike materials exhibit interesting properties in experimental insulations. Then there is that entirely new polymer that is responsible for the silicone-rubber group. Certainly with all these compounds the number of permutations in which the rubber-compound chemist can indulge are legion.

If less than two years ago an enterprising engineer requested from the wire and cable manufacturers their recommendations together with test lengths of single-conductor 600-v moisture-resisting rubber or rubberlike insulated, neoprene sheathed control cable he would very likely have been presented with a minimum of six different types. This cross section of the industries' recommendations for one condition, namely service in wet locations, may be grouped in a very general way as Performance, Heat Resisting, Butyl, RW, Submarine and Oil Base.

Thermoplastics

In addition to these thermosetting insulations the newer thermoplastic insulating materials are available in large varieties. These thermoplastics are nonvulcanizable resins in which the plasticity or flow is a function of temperature. The most common are the polyvinyl-chloride (PVC) insulations, which may be purchased from the chemical companies either as a hard, dry, powdered resin to which a suitable plasticizer and fillers must be added before application to the conductor, or as a fully plasticized compound ready for extrusion over the conductor. There are some 12 variations of PVC compounds available from one chemical house alone, and at least five of these are eligible for the moisture-resisting-type wire.

Polyethylene

Equally well known is polyethylene but, unlike the hard PVC resins, it need not be compounded to produce original flexibility. Experience has shown that it must be compounded, usually with one or two per cent of carbon black, to inhibit oxidation embrittlement. It is also desirable to compound the commercial grade polyethylene resin with some 10% of 40,000 molecular weight polyisobutylene to impart resistance to environmental cracking.

Other thermoplastic insulating materials have been developed, but have been limited either by cost or their own peculiar characteristics.

The foregoing emphasizes the vast number of insulations that are available from the various wire and cable manufacturers—a confusing picture, a real problem of selection to the average designing or operating engineer. It is obvious that all these insulations are the result of compounding basic material with other selected ingredients. Not only must the formulation of the compound be correct, but also of equal importance is the necessity of carefully weighing and then mixing with correct sequence, time and temperature. Complete control of these variables is needed to produce a uniform and homogeneous insulation. These factors all add up to reliability.

The carefully compounded insulation is of little use, however, if the insulating process leaves mechanical imperfections and weaknesses. While high-voltage tests cannot find all latent defects, the purchaser's assurance against trouble in service is in direct relation to the magnitude and thoroughness of the high-voltage tests made at the factory.

All-important is long life. Generating stations are usually depreciated at not more than 3% per year. This means that the materials and equipment, including the wires and cables, should last for at least 33 years. The original cost of the best cables is more than offset by savings in replacement cost. This is particularly true with today's high labor rates, which are not likely to become lower in the future.

Of vital concern in the choice of station cables is their ability to withstand long-time exposure to moisture that may accumulate in trapped conduits, in underground runs or may work in at the ends. An inherently moisture-resisting compound is one with no absorptive fillers and with an extremely low diffusion rate.

Selection of Insulation

Faced with these four prerequisites and a number of insulations, the question of selection invariably resolves itself into two parts: (1) What is the service record or background of the insulation? (2) How do the test data look?

The first source of quantitative test data is the particular wire and cable manufacturer involved. This type of data is seldom directly comparable with others because of variations in test methods and procedures, and the

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* Presented before the meeting of the Engineering and Operating Section of the Pacific Coast Electrical Assn., Fresno, Calif., March 20-21, by I. W. Borda, vice-president, The Okonite Co., San Francisco.

understandable desire on the part of each manufacturer to protect his product from unorthodox tests designed for product control rather than as a performance criterion. The second source of test data can come only from tests directed by that enterprising engineer. Unfortunately there are many pitfalls, even to an experienced researcher, such as nonrepresentative samples, too few and too short samples, inadvertent comparison of insulations whose characteristics are inherently different, selection of improper tests, and the inability to translate accelerated test data into long-time service life. It has been found time and again that no matter how many different tests are run in advance, it is virtually impossible to account for all the factors that may lead to reduced life expectancy of an insulation.

Some picture of the homogeneity of the compound and the mechanical integrity of the insulation can be gained on small 600-v insulated wires by applying, while immersed, a 1-minute 6,000-v a-c proof test, and following this with a 10-minute 13,500-v d-c potential. Rising voltage breakdown and step-type voltage breakdown tests are also helpful but, because the ultimate values are involved, they may be regarded by some as compound control tests rather than performance tests. It is of interest that these tests, when applied to insulations in the six categories previously mentioned, developed a wide spread in the results, thus spotlighting real differences.

Room temperature water immersion permits measurement of the insulation resistance, a-c capacity and power factor. All are characteristics that can be compared to standards to achieve quality control of an insulation. When these values are observed over a very long period of time and changes are nonexistent or insignificant, it may be said that the insulation is moisture resisting. For example, a 600-v control wire with a 3/64-in. wall of an oil base insulation and 1/64-in. wall of neoprene sheath showed virtually the same insulation resistance throughout an 11-year room temperature water immersion study. Test records over 20-year periods on the plain oil base insulation likewise show this same stability.

With reference to long life, it has been found that long-time exposure at 75 C in the Geer air oven gives some comparative indications as to the aging characteristics of an insulation or sheath. However, the bendability of the insulation after such exposure is the guide rather than a tensile or elongation measurement. If a cable does not show shortness, that is, has freedom from cracking when bent around its own diameter, it is obvious that it is still suited for further use.

Accelerated Aging Tests

Consider next accelerated aging tests. In a competitive market such as found in the wire and cable industry, attention is attracted by accelerated test data, which on casual examination appear to be a way of evaluating expected performance of insulated cables. Not only can such comparisons lead to fallacious conclusions, but they will invariably result in someone compounding to "beat" the established values, thus casting aside all background. Such data are useful only as a "control" on a particular insulation. They are not a means of predicting service performance.

In the development of new rubber compounds where no data on prolonged natural aging are available, the industry is forced to accept the results of comparative accelerated tests on compounds whose compositions are almost identical except for the variable under investigation. Such comparisons can be judged safely only when the precise, detailed chemical compositions of the formulas and degree of vulcanization are known. Obviously, only those who formulate and process the compounds know these facts. Thus it is impossible for others to predict accurately the life of an insulation solely on the basis of an accelerated test. Reference to ASTM Specification D582-48, Accelerated Aging of Vulcanized Rubber by the Oxygen-Pressure Method, to cite one, discloses the statement: "No direct correlation between this accelerated test and the natural life of rubber is given or implied."

Now regarding accelerated moisture absorption tests, the 1951 issue of the IPCEA General Specifications in Appendix N gives "Accelerated Water Absorption Test Methods for Rubber and Rubberlike Insulations." This is the culmination of a 15-year project but these short-time tests still cannot give a true indication of long-time behavior. The mechanical moisture absorption test, detailed under Gravimetric Method, is a function of the surface absorption rate of a definite compound and is no measure of the total absorption or its effect on the electrical stability. This test is used successfully as a control test on a very definite type of compound, but shows no correlation with long-time electrical stability of different types of rubber insulations.

Referring again to these IPCEA tests, under the heading of Electrical Method are the details for a 50 C accelerated water absorption test in which the capacity and power factor are observed after 1, 7 and 14 days, and the per cent change is noted. Limits have been set up, and it follows that the moisture resistance is judged by the insulation's ability to meet these limits. It is interesting that all the rubber insulations in the six categories previously mentioned, even when tested with their intimately associated neoprene sheaths, appeared to meet these limits for a 2-week test, and it is significant that each went on as the months passed to develop a different and characteristic curve. Even though many were basically not moisture-resisting stocks, there was no significant change up to 10 months. By the end of 20 months, however, only three remained, all others having failed electrically.

By comparing the capacity data obtained in the 11-year room temperature test with that for the same oil base insulation in the 50 C accelerated moisture test some might deduce that it will have at least a 35-year life. On the other hand, basing the life expectancy on the insulation resistance, a sensitive indicator, it becomes indeterminately long, since the room temperature values are relatively stable. Thus a clear-cut correlation is impossible.

Obviously the 50 C test is impractical as a specification test, because of the long immersion period required to produce results. Its correlation with service performance has yet to be established.

The problem posed by this paper is the selection from a large number of compounds of an insulated wire or cable that (1) has a uniform and homogeneous compound, (2) has no mechanical imperfections, (3) has a basically correct formulation for service in a wet location and (4) will give long life in the heat and humidity of a modern station. Even though some reasonable tests are available to help delve into these desired attributes, most of them are little more than control tests since they do not depend upon an acceleration factor. In any event the validity of accelerated tests is questionable since they generally change the type of internal reaction. When carried out for prolonged periods control tests, on the other hand, may be more significant, but it should be understood thoroughly that all these tests represent only a few of the many independent factors found in actual service.

Snow Completely Buries High Lines

Linemen's spurs give way to snowshoes in digging out and repairing 60- and 110-kv lines near Donner Summit in the high Sierra of California as snow melts and settles. Sections of lines were completely buried by the past winter's record snows and operated that way for two months or more. Lines were patrolled and signs put up to warn skiers away. At left above, Pacific Gas and Electric crew is shown digging out conductors on 60-kv line. Right view shows trench dug to clear 60-kv line and reach and repair 2,400-v circuit. At left crew digs out 110-kv line that operated completely buried in snow for weeks to feed far away Reno's bright lights.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

The outlook

With Spring and a relaxation of permission to build, construction activity took a leap upward again in April, all except the San Francisco Bay area where a carpenters' strike has slowed down the construction crafts to maintenance and repairs and made these so competitive that few are breaking even on it. Many building projects dormant on architects' tables began to come out from the wraps for bidding. San Diego area was particularly busy with defense plant and housing and military installation. Other areas were feeling a real bind for sufficient work to employ the men on the bench. High construction costs scared civilians.

Wage hikes

Wage increases were granted however in the already top scale electricians with not much more than a grumble from contractors who feel that the cards are stacked against them by the WSB and they might as well relax and enjoy it. Portland's scale went up 8½c an hour to $2.72½. In San Diego the NECA and union settled for $2.93. Los Angeles went to $3, as San Francisco had done earlier. Across the bay in Alameda and Contra Costa Counties the argument was still on as to what "parity" with San Francisco meant, and this definition may go to the Council on Industrial Relations. No fringes so far although all are talking about them since WSB set the new pattern for steel.

Selling by TV

Sylvania has begun to ship its fluorescent lighting fixtures without lamps as a means of speeding service and because there are now seven colors and several types and the plan reduces inventory required for all.

Expand

Ets-Hokin & Galvan are building their biggest shop in the state at San Diego in the Harbor Drive district to serve many navy and marine customers with every facility needed. This electrical contracting firm, calling itself simply "electricians," has shops in San Francisco, the headquarters, Oakland, Stockton, Los Angeles harbor district and San Diego. Al Eddy is San Diego manager.

Briefed

NECA's District 6 annual conferences at Santa Barbara will be held before this comes from the press. It is to be at the Mar Monte hotel. J. D. O'Connor of Lupen & Hawley, Sacramento, is district vice-president and will preside. Will Pregill, manager of the Santa Barbara area chapter, and local committees had arrangements in hand and the program was to start with a meeting of the California Conference of NECA Chapters the morning of May 9. Business sessions were to run Friday afternoon and Saturday, with a banquet Saturday evening. Members of NECA's national staff at Washington were to bring latest information on the materials, legislation, labor, welfare, and business situations and outline the new educational courses, such as estimating.

Conform to code

California's State Safety Orders have been changed in two particulars that are of vital interest, as well as in some minor editorial changes. The two changes filed May 1 are: 1. To bring the ampere rating of wires sized No. 10 to 30 amp and No. 8 to 40 amp as it is in the NECode. 2. To permit fused switches on bus duct at heights above 6½ ft from the floor if they are operable from the floor and if a platform, either fixed or portable, is available to allow an electrician to service them safely. The switch must be of the Type A, with cover interlock. The entire safety orders will not be reprinted but copies of the changes can be obtained from the state printing office at Sacramento.

Still talk

Aluminum wire is still more talked about than available. The inspectors seem skeptical that lasting connections can be made until better connectors are designed especially for it. From a practical sense they express the opinion that unless it is made to pull easier it will not be very popular with the wiremen and may suffer the same fate that aluminum conduit did—they wouldn't use it; even fishtapes stuck in it.

Build your own

Despite inspector disapproval manufacturers of panelboards have asked Underwriters' Laboratories to approve an "Erector-set" type of assembly, in which the cabinet with busbars only would be listed, then the contractor, wholesaler or purchaser could assemble it in any combination of plug-in type circuit breakers he wanted, ranging from 15 to 50 amp. What inspectors object to is not the original installation, which they can see goes in with the right sized wires, but that it is too easy to remove a 15-amp breaker and substitute a 30 without increasing the wire size and carrying capacity to match.

No percentages

Although Underwriters' have changed enclosed switch standards in an attempt to get them labeled more understandably electrical inspectors at the annual chapter meetings in Montana, Idaho, Eastern Washington and Puget Sound and Oregon in joint meetings are not satisfied the new standards do what was hoped. There is a demand on inspectors' and contractors' part that enclosed switches be rated at the actual load they can carry, and not need to be derated. Customers, they contend, think the industry is deliberately misleading them and demand more honest labeling.

Faithful worker

Leonard A. Hobbs has been nominated to succeed Carl O. Martin as South Pacific regional vice-president of Illuminating Engineering Society. He has long served in IES affairs, once as chairman of the San Francisco chapter, also active in the Southern California Section, has been a national director. He also has been secretary of the RLM association and served on lighting industry advisory committees to the war and defense effort. He is vice-president and general manager of Smoot-Holman Co.

Attack on conduit

A drive on the part of the home builders associations in the Los Angeles area to have the Los Angeles municipal wiring code amended to permit the use of nonmetallic sheathed cable in residential construction was turned down by the City Council April 25 by unanimous vote after some pretty stormy sessions on the proposal before the Building & Safety Commission. Tract builders enlisted the Los Angeles Chamber of Commerce on their side, claiming it would save $50 a house in wiring. The Los Angeles County code permits cable. But they failed to show that either there was a shortage of conduit or flex, or that they intended to pass on any savings to house buyers. It was all part of a drive to reduce all building standards, even widths of streets to build what the Los Angeles fire chief charged would become the slums of tomorrow.

Parting

Henry N. Muller resigned from Westinghouse Electric Supply Co. as its Oakland branch manager, after 25 years of service, in a surprise move early last month, attributed to a difference in views as to policy. He has not announced any new plans but maintains an office at 1719 Clinton Ave., Alameda. He made an outstanding record in his operation of the supply branch in growing Oakland territory.

Student prizes

Winners of the 1952 Architectural Student Lighting Design competition of the Southern California Section, IES, were Charles G. Kanner, 1st; James W. Bird, 2nd; and Wm. S. Lewis, 3rd. Henry Yen Foon, Merle A. Rousellot and Kennth A. Bristol won honorable mentions. G. L. Payne won an award for a trophy design for the annual competition. The Section entered the national IES "My Most Interesting Lighting Job" competition with vigor and made the presentation of entries one of the features of its May 7 meeting.

Rep changes

Milton Grossman, formerly the Globe Lighting representative, is now with Ruby Lighting, and Jake Imhof and his Manufacturers' Marketing Service now represent the Miller line in southern California. Other lines handled include Bede Products, Circo Products Division of Optimus Equipment Co., Fostoria Pressed Steel; U-C Lite Mfg. Co., Vokar Corp., McQuay-Norris Mfg. Co. and Paramount Industries.

Jumped the news

Electric Supplies Distributing Co. of San Diego has taken over one or two more of the L. B. Marsh companies, these in Long Beach. Recently it took over the Santa Ana house and we reported it had taken the Long Beach business and were called on it by Fred Goss, ESD manager, but perhaps we were only clairvoyant with news before it happened.

Conflict

Nevada Chapter, IAEI, had to change the date of its annual statewide meeting in Las Vegas to May 19, the same date as that of the Utah chapter, because hotel accommodations were not available on May 16, the previous date due to a big Helldorado festival in that weekend.

Two new high power VHF TV transmitters, a 25-kw for channels 2-6 and a 50-kw for channels 7-13 were announced by DuMont Laboratories, at a reduced price, using less floor space and with longer lifed tubes, in readiness for FCC's granting of new station licenses or of increased power in existing stations. **All ready**

L. J. Carlon of the Albert Sechrist Mfg. Co. of Denver was on the panel on planned lighting at the Southwestern Regional Conference of the IES at Tulsa, Okla. **Spoke**

Research grants have been set up at MIT by the F. W. Wakefield Brass Co. and a student fellowship at Case IT. The MIT fund is for study of all the environmental factors in seeing. That at Case is for a study of certain phases of air conditioning and radiation. Wakefield has participated in a co-ordinated classroom study at Stanford University also. **Study money**

Washington Industrial Products of Seattle has acquired the patent rights for Campbell bake ovens, known by the trade name Oven King. Campbell is no longer associated with the firm. Present owners are the same as that of Coates Electric Mfg. Co. of Seattle, with 25 years experience in electric oven building. A new 16-page catalog illustrates its line which ranges from a 20 loaf model to a 3,000 loaves per hour unit. **Take over**

John R. Felton, an industrial wage analyst, was appointed director of the Los Angeles office of the Wage Stabilization Board for California, Arizona and Nevada by Irving Bernstein, regional board chairman, succeeding Donald Strauss, who returned to Douglas Aircraft. Felton has been on the staff since September 1951, was once assistant professor of economics at San Diego State College, later at UCLA. **New WSB director**

Notice was given to employers by WSB that even though they obtain WSB approval of wage increases illegally paid prior to board action they remain subject to prosecution. A clinic on wage stabilization problems was held April 30 at the Berkeley campus of University of California with Archibald Cox, co-chairman of the Construction Industry Stabilization Commission from Washington and a panel of industry and labor members of board to answer questions from employers, unions and workers. **Can't escape**

Champion Lamp Works of Lynn, Mass., now has a complete planned cleaning program and a group replacement plan for both fluorescent and incandescent lamps which Panama Lamp & Commercial Co., Champion agents for the West, is now making available to electrical contractors to develop a successful lighting maintenance business. **Cleanup program**

Harry Marsh, formerly with Supreme Lighting Co. in Los Angeles now has a business of his own called Marsh Lighting & Mfg. Co., located at 2117 Pointview St., Los Angeles. He manufactures a standard line of louvered fixtures, commercial and industrial fixtures and some residential lighting units. **On his own**

Ed Peterson is now Trade Winds fan and Touchplate and Ruby Lighting representative for San Diego and Imperial counties and Yuma, Ariz. **New**

Light Control Co. of 3217 Casitas Ave., Los Angeles, has issued a new specification sheet covering its industrial lighting fixtures of the fluorescent type. In it is featured a new design with apertures in the reflector which allows an upward component of about 6.9%. **Up light**

Public hearing of the proposed new city electrical code for Seattle was held April 22, conducted by the city council's public safety committee. A committee of the Washington Electric Club has been working on the draft for two years, chairmanned by John Majerus, NECA chapter manager. A board of review would be set up by it to pass on changes to bring it up to date and to hear cases where differences of opinion exist about the application of the code. **Ready to adopt**

Wiring promotion is on television in San Diego and already contractors are feeling public response from this program. The Contractors' Division of San Diego Bureau of Home Appliances sponsors a spot commercial on a cowboy kiddies program once a week. Each time he explains a gadget, such as a fuse, a switch, some wire, etc.—something visual—tells what it means, shows locations on a house plan chart and advises adequate wiring installed by an electrical contractor. From the first two broadcasts requests were phoned in for 75 booklets. **Selling by TV**

Trade

An exchange service plan has been announced by the DeVilbiss Co., makers of spray systems. It is a rebuilt exchange program and users are furnished factory rebuilt equipment for that they turn in with new unit guarantee. One of the rebuilding centers is at Santa Clara, Calif.

Member service

Pacific Electrical Contractors Assn. of Portland is making a compilation of permits, fees, bonds and codes in cities in Oregon and Washington for its members. It is also studying types of business forms needed in a series of meetings instituted by its president, Arthur McLean. A standard set of forms may be developed from these meetings which the association will produce in quantity for its members' use.

Simple preferred

Names used in illumination to designate light and brightness are under study by a committee on nomenclature in the IES, of which Dan M. Finch, professor of electrical engineering, University of California, is chairman. The committee favors simple terms to some more fancy ones proposed. An article on the subject is in preparation.

Wire decline

While the supply of wiring materials seems to be reasonably ample at the present time for the amount of work to be done, the Electrical Apparatus and Supply Distributors Industry Advisory Committee to NPA told the latter at a meeting April 9, that it was selling itself out of business and recommended a basic change in the CMP for copper wire mill products. They urged adoption of standardization and conservation measures, such as production of only one single braid wire in sizes 14 to 8 and double braid in sizes 8 and up. Attending the meeting from the West were Fred Goss of Electrical Supplies Distributing Co., San Diego, and Harry Byrne, Jr., North Coast Electric Co., Portland.

Recovering

G. A. Howarth, Utah-Idaho Chapter, NECA, manager, is in the hospital in Salt Lake following a heart attack and is said to be on the way to recovery.

To stimulate business

An industrial electrification council was formed by the commercial division of Edison Electric Institute at its annual sales conference in Chicago in mid-April. Its purpose will be to supply industry with information on the application of electricity and apparatus to industrial processes and to coordinate promotional programs of various utility companies and supplement them with national programs. First project will be the industrial electric heating methods.

Top honors

Winners from the West in the International Lighting Exposition merit award competition numbered the following: Gold Seal Awards—architects and consulting engineers, Herbert A. Delius, San Francisco, a bank lighting installation; merit award with distinction—electrical contractors, A. R. Parker & Walter Long, G. E. Supply, San Francisco, an industrial machine shop; utility representatives, Harry L. Foor, So. Calif. Edison, a general office; stores, David Curtis, S. D. G. & E. Co., a jewelry store; office, Blair E. Ploughman, Washington Water Power Co., a small office;

And also

Other western winners of merit awards were: Charles C. Bell, So. Colo. Power; E. L. Bailey, contractor, Albuquerque; Marvin R. Hooge, Montana-Dakota Utilities; J. D. Whitnell, Cent. Ariz. L&P Co.; Harold F. Hall, So. Calif. Edison; W. R. Owings, same company; F. Bischofberger, Pub. Serv. of Colo.; Clement Felzer, Jr., Seattle Engineering Dept.; R. E. Adam, North Coast Electric, Seattle; Robert B. Earl, Earl & Gropp, San Francisco; Walter Kuetzing, architect, Billings; Charles A. Baylon, Aberdeen, Wash., and C. A. Winkelhake, Stanford school planning laboratory; Hugh J. Richardson, PG and E, Chico; D. R. Shields, So. Calif. Edison.

Move

National Carbon Company's Los Angeles office is now in the Union Carbide & Carbon building at 2770 Leonis Blvd., Vernon, G. E. Barton says.

New edition

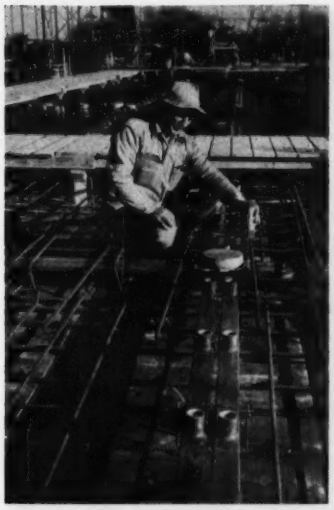
Fundamental Jobs in Electricity is the title of a new edition being published by McGraw-Hill for use in teaching apprentices. It combines the best features of job sheets, workbooks and textbooks. The new edition includes electronics and TV material.

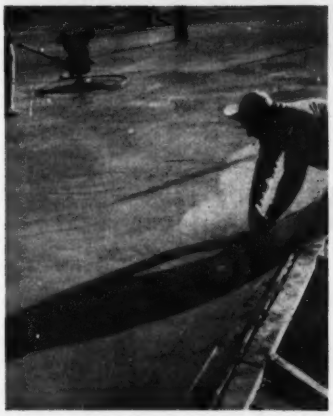
Welfare costs

In considering any welfare plans proposed it is well for employers to remember that absenteeism already costs about $56.02 per employee per year, in direct costs only—wages and salaries paid to employees for time lost and work not done, reminds the National Industrial Service Assn. and says such items should be added to your labor costs. Any welfare plan may also have added overhead costs over the "cents."

Adapted to Material Shortages

Sacramento office building employs some new techniques and distribution





Dick Abramson indicates with a rule the height of the junction boxes from the slab, also the extra collar and higher inserts needed on the underfloor duct. Length of the adjusting bolt can also be seen in the foreground of the top picture. The second picture dimly shows some of the junction box covers in the finished concrete slab (in the upper right side of the picture). Inserts do not come to the surface quite. Lower picture shows two banks of dry-type transformers on the special racks designed for them, before connecting

Adaptability is called for in these days of steel restrictions. When other branches of the construction business have to shift methods in order to conserve steel or copper, the electrical contractor is called upon to do some adapting himself. This is well demonstrated in the installation of underfloor duct in the California Western States Life Insurance Co. building at 21st and L St., Sacramento, being done by the George Foss Electric Co. Bert Naylor, superintendent, designed some of the adaptations. Electrical engineer was Harold Gerber of A. A. Coddington Co., San Francisco.

Not permitted any steel beams, this building project was allowed to use reinforcing steel for concrete construction. This called for a 9½-in.-deep slab on each of the four floors. To bring the underfloor duct within reach under such conditions called for National Electrical Products to adapt its duct with 2⅜-in. inserts instead of the normal length. Likewise it called for longer bolts from the pan to support the underfloor duct at the required height within the concrete slab. Bolts of 6½ in. were used to position the duct in the slab, an idea of Naylor's. Likewise the junction boxes had to have a higher collar to bring their covers within an eighth to a quarter-inch beneath the finished floor slab.

A double duct with inserts on 2-ft centers, the first 1 ft from the junction box, is run in parallel rows on all four floors. The first row is 5 ft from the wall and other spacing is 5 ft 6 in., 5 ft 9 in., and in one case 6 ft 2 in. as a maximum. The junction boxes are on about 40-ft centers. There are about 8,000 ft of duct on each deck of the 150x203-ft building. Only the main floor slab has pipe runs in it also.

Distribution in this building is also of interest. It is a 480-v distribution system, utilizing some 37 dry-type 15-kva transformers, in banks of three or six, all located in the basement (except one on the roof) directly below concentrations of load. Power is brought in from the main vault at 480 v and feeds through 500,000 cir mil to the transformer banks. The 480 to 120/208 Y transformers are mounted on brackets designed to hold them above the floor. Runs go up from each transformer bank to the four floors above where panels are located for switching the circuits serving lighting and the underfloor convenience outlet circuits.

Because of restrictions put on building, this structure just came under the wire but permission was granted with restrictions. It was necessary to engineer the building "backwards" from the usual procedure, according to Gerber. The contractor had to order all the materials in advance and then the engineers had to fit these into the job as they were drawing up the plans.

Other features of the electrical design and installation include a complete sound system for providing music throughout the building, air conditioning throughout, cove lighting in the lobby, a special clock system.

The 12-in. speakers are ingeniously concealed behind panels of acoustical tile in the ceilings so arranged to be removed for servicing. The large speakers give excellent sound quality operated at low volume.

All fans for the air conditioning are controlled from a special panel in the basement.

The refrigeration and air conditioning equipment, a 300-hp Carrier system, is fed the 480 v directly from the main board.

This type of installation was conservative on the use of copper and still gives utmost flexibility. The duct system supplies both telephone, office machine and convenience outlet distribution. Installation was supervised by Dick Abramson, foreman for the Foss Electric Co.

New fluorescent fixture provides good safety lighting at rural intersection and glareless vision to motorists on California highway

New Luminaire for Intersection Lighting

F. M. Carter

Assistant Traffic Engineer
California Division of Highways*

A distinction between rural lighting and urban lighting is being recognized. This distinction also includes a difference between continuous lighting and intersection lighting. Rural intersection lighting has always been a problem to illuminating engineers because the ordinary street lighting luminaires, which are not objectionable in cities where there is an abundance of other lights, become an annoying glare source against the black sky background at rural intersections on our high-speed highways.

The present-day street lighting luminaires with vertical burning lamps produce a definite glare to the vehicle driver. The horizontal burning mercury vapor lamps and a new-type luminaire permit a reduction of this glare by the addition of glare shields on the outside of the luminaire.

For many years it has been thought that fluorescent lamps should be used, but the ordinary fluorescent lamps had several disadvantages that made their use impractical for street or highway lighting. In recent years, however, there has been considerable activity in the development of fluorescent lamps. One recent development has been the introduction of the slimline types of fluorescent lamps that are now available in a variety of sizes and colors. These lamps are instant starting, requiring no starter as do ordinary fluorescent lamps, and have a high light output as well as an extremely long life.

The California Division of Highways has been using these lamps to illuminate overhead signs on freeways for a year or more, as illustrated. Results have been very satisfactory. Fixtures for mounting the lights at the bottom of the sign are being developed and considerable benefits are expected. Placing the lighting fixture at the bottom eliminates objectionable glare at night and also eliminates shadows on the sign during the day.

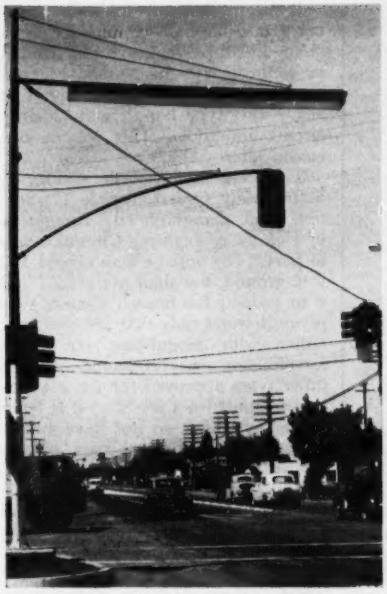
One of the latest fluorescent lamps announced is 1½ in. in diameter, 8 ft long and produces a light output of 5,800 lumens at an operating current of 600 ma. Four of these lamps when placed in one luminaire would produce a total of 23,200 lumens, or slightly more than the amount produced by one 20,000-lumen mercury vapor lamp as used in present-day luminaires.

The ordinary street lighting luminaire is designed for continuous lighting of the street and consequently directs the light equally in both directions. When it is mounted on the far right corner of the intersection, the light that is directed into the intersection appears as a bright pattern on the pavement for the approaching motorist. The light that is directed away from the intersection is reflected away from the approaching motorist and is of little value in building up pavement brightness. This is accentuated when the pavement is wet.

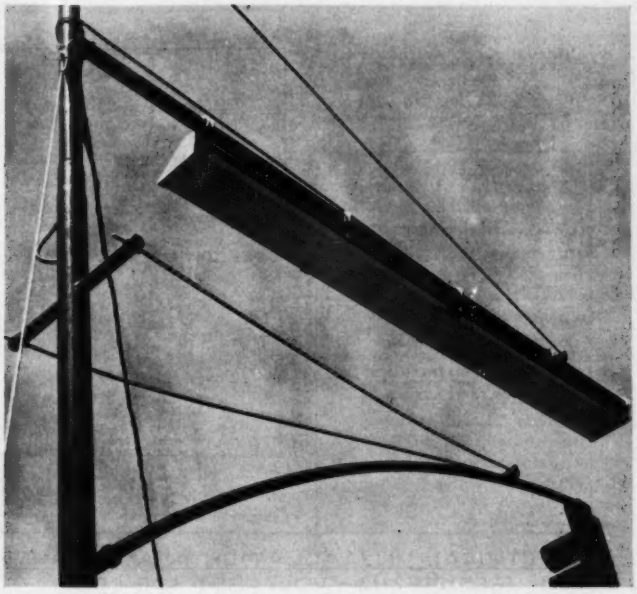
It seems reasonable, therefore, that for intersection lighting a luminaire that directs the main portion of its light into the intersection would be more efficient.

Personnel of the traffic control section of the traffic department of the California Division of Highways re-

* Also director, Institute of Traffic Engineers; member, Street and Highway Lighting Committee, IES.



Mounting details of the fluorescent lighting unit



Fluorescent lighting fixture uses four 600-ma lamps providing 23,200 lumens

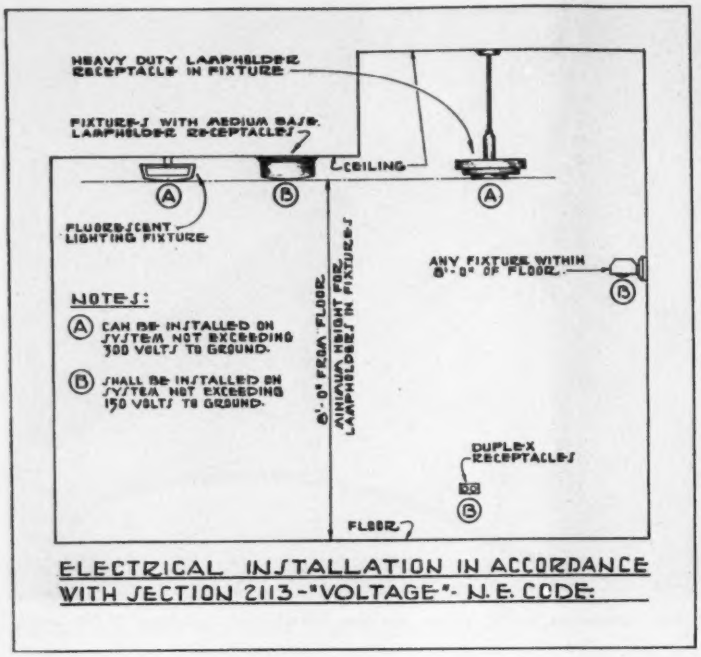
cently designed and had manufactured a lighting unit specifically for highway intersection illumination.

The luminaire, type 100, was manufactured for the Division of Highways by Smoot-Holman Co. of Los Angeles. The unit as designed is approximately 16 ft long, and the reflector is a paraseil shape with white porcelain enameled facets to reflect the light rays. Four 8-ft fluorescent lamps are used. The unit is supported at right angles to the traveled way and approximately 28 ft above the pavement by a 20-ft 3-in. horizontal mast arm.

This luminaire, as illustrated, uses four of the new lamps and is designed to direct the light in one direction only. In accordance with American standard practice, the location for an intersection light is on the far right corner as one approaches the intersection. This produces a bright area on the pavement in the intersection and enables the approaching driver to see objects in the intersection both by direct illumination and by silhouette.

Another major advantage of the 16-ft-long fluorescent luminaire is that the wide brightness pattern on the pavement is not affected by a wet pavement surface and there are no excessively bright streaks on the pavement surface as is so often the case with ordinary street lights on a rainy night.

Freeway direction signs used on California highways. Later fixtures with lights at bottom of sign will eliminate objectionable glare


HEAVY DUTY LAMPHOLDER RECEPTACLE IN FIXTURE
FIXTURES WITH MEDIUM BASE LAMPHOLDER RECEPTACLES
CEILING
A
B
A
FLUORESCENT LIGHTING FIXTURE
ANY FIXTURE WITHIN 8'-0" OF FLOOR
B
NOTES:
A CAN BE INSTALLED ON SYSTEM NOT EXCEEDING 300 VOLTS TO GROUND.
B SHALL BE INSTALLED ON SYSTEM NOT EXCEEDING 150 VOLTS TO GROUND.
8'-0" FROM FLOOR
MINIMUM HEIGHT FOR LAMPHOLDERS IN FIXTURES
DUPLEX RECEPTACLES
B
FLOOR
ELECTRICAL INSTALLATION IN ACCORDANCE WITH SECTION 2113-"VOLTAGE"- N.E. CODE:

Higher Voltage Lighting Circuits for Industrial-Type Buildings

Harold L. Gerber

A. A. Coddington & Co., Consulting Engineers, San Francisco*

You will note that the title of this paper is very specific. It deals with industrial-type buildings only.

When the 1951 edition of the National Electrical Code was adopted, it included many changes that were for the betterment of electrical wiring installations. Some of these result in greater economy in costs, which in turn either produces increased illumination values for present costs or obtains present illumination values at greater savings in the cost of installation.

These new code permissions have been of decided benefit in planning new electrical installations, especially in these days of allocation of copper, aluminum and steel materials.

Before discussing this new type of wiring distribution system, with its advantages and disadvantages, I would like to make the following facts clearly and definitely understood.

Section 2113 of the 1951 edition of the NE Code—Subject, *Voltage*, clearly states that, in industrial establishments the voltage may exceed 150 v to ground, but shall not exceed 300 v to ground, for branch circuits supplying lighting fixtures only that are equipped with mogul-base screw-shell lampholders or with lampholders of other types approved for the application, mounted not less than 8 ft from the floor, which do not have switch control as an integral part of the fixture.

This means that the installation shall be confined to industrial buildings only, not commercial or school or office buildings. "Industrial" includes any office section of any industrial building whereby the installation can be made in accordance with the NE Code as hereinbefore stated.

* Presented at IES South Pacific Regional Conference, San Francisco, March 13, 1952.

It means that any fixture containing a medium-base lampholder for a lamp of 200 w or less rating cannot be connected to this system. Fluorescent lamp fixtures are considered as heavy-duty-type lamps, with 20-amp circuit limitations. This will be discussed later.

The 1951 edition of the California State Safety Orders, Article 17, Section 2465, paragraph (d), *Limitation of Voltage of Lighting Circuits*, reads in part, "The voltage may exceed 150 v to ground, but shall not exceed 300 v to ground for branch circuits supplying fixtures only that are equipped either with mogul-base screw-shell lampholders or with lampholders of other types approved for the application, mounted not less than 8 ft from the floor, which do not have switch control as an integral part of the fixture."

You will note that this section is the same as the National Electrical Code, with one exception. The reference to industrial installation has been omitted, thereby allowing this type of installation in all types of buildings, but with the governing installation requirements.

There has been considerable advertising and publicity on a nation-wide basis by one of the major electrical companies advocating the installation of this system in schools, offices and commercial buildings.

A check was made with the secretary of the Electrical Committee of the National Electrical Code to ascertain whether or not any changes or amendments to the 1951 edition of the code have been made that would allow this type of installation to be made in other than industrial installations and the answer was definitely "No," but there has been some agitating for a suggested change along these lines. So, regardless of the advertising, the NE Code provisions are still in effect.

Inasmuch as the NE Code and the State Safety Orders differ, it is necessary first to secure the permission of the local inspection authority having jurisdiction in each location where this is installed in other than industrial installations, since his opinion as to which regulation is of the highest standard is the governing factor as to whether or not permission for installation is secured.

Different Types of Circuits

Before it is possible to compare values of the different systems, it is necessary to review the permissible types and values of lighting circuits. (See accompanying table.)

Types of Circuits to Consider in Design

Voltage	Amperage	Phase	No. Wires	Wire Size	Wattage	Increase	Length for 2% drop
120	15	Single	2	14	1,800		30
				12	1,800		47
267	15		2	12	4,000	222%	115
120	20	Single	2	12	2,400		36
267	20		2	12	5,340	222%	85
120	30	Single	2	10	3,600		
267	30		2	10	8,010	222%	90
120	50	Single	2	6	6,000		
267	50		2	6	13,350		138
120/208	15	3	4	14			59
267/460	15	3	4	14			125
120/208	15	3	4	12			92
267/460	15	3	4	12			200
120/208	20	3	4	12			70
267/460	20	3	4	12			148
120/208	30	3	4	10			74
267/460	30	3	4	10			158
120/208	50	3	4	6			112
267/460	50	3	4	6			237

This table indicates that savings in copper and steel are variable depending upon the type, design and control of each specific installation. No definite percentage factor can be established but an over-all average between 20% and 33⅓% can be assumed for an average installation where the maximum load requirements permit this type of installation.

It is understood that, with these types of installations, it is necessary to have two types of distribution systems: one for the 267/460-v lighting system and another 120/208-v, 3-phase, 4-wire grounded-wye system to supply lighting circuits of other than heavy-duty lampholder types and convenience receptacles, and other special circuits supplying equipment within 8 ft 0 in. from the floor.

This means that double sets of feeders and two types of panel boards, one for each system, must be installed.

Panel Board Costs

An average 20-circuit panel board for the conventional type Class I, NAI-B type panel board is $180, or $9 per circuit.

The average cost of a 20-circuit panel board with a Class I, 250-v, quick-lag type of circuit breaker is $140 or $7 per circuit.

The average cost of a 267-v single-pole circuit breaker type of 20-circuit panel board is approximately $238, or approximately $20 per circuit. Although the cost per circuit for the 267-v circuit breaker is approximately 300% of the cost of the quick-lag type, this cost is partly offset by the fact that each 267-v circuit has a capacity of 222% of the 120-v circuit and the panel board would require 10 circuits in lieu of the 20-circuit panel board.

Additional air-cooled transformers with primary overload protection must be installed for the 120/208-v lighting and receptacle circuits, which is a cost on the debit side of the ledger.

Installation Restrictions

In existing underground service distribution areas, where secondary network or underground supply systems of less than 300 v between conductors are already installed, and especially when material shortages affect the utility company to a greater extent than they do the consumer, it is not probable that a separate 440-v secondary service could be installed.

We must bear in mind that the 440-v 3-phase distribution system of the utility companies in the Western states is of the 3-phase, delta, ungrounded type, with 440 v between phase conductors or to ground and cannot be used for this 267/460-v system without the customer installing his own transformers for this conversion which adds considerable cost to the installation, depending upon load quantities.

In overhead distribution areas, the present 440-v, 3-phase line construction would not permit additional pin positions for the installation of a grounded conductor. The utility company would be forced to install and stock special transformers for this 267/460-v type of installation.

So, in order to take advantage of this 267/460-v distribution system, it is necessary in most cases to supply an installation with a commercial load in excess of 100 kw, with primary service, primary metering, the owner purchasing his own transformer, or bank of transformers, with added costs and space requirements for a transformer vault, or in lieu of a vault, primary switchgear and askeral-type transformers.

In large industrial installations, with primary service and metering, with primary feeder distribution system, and transformers with delta primary and 267/460-v secondaries installed at load centers to supply both lighting and power circuits, this new system is the most economical and efficient of any that has been permitted to be installed under National Electrical Code and State Safety Order provisions.

Some Advantages of 267/460 v

- Save copper—or make the allotment go further.
- More wattage on smaller sizes of wire.
- Longer runs for the same voltage drop.
- Save steel by using smaller conduit sizes.
- Some saving in total installation cost where conditions are favorable.
- Low-voltage switching possible in many cases.
- Better lamp performance on higher voltages.

Some Limitations, However

- Applicable only to industrial plants—(NE Code).
- Only where fixtures are **over** 8 ft from the floor.
- Lampholders must be of a type approved for heavy-duty classification.
- Requires separate 120/240 system for convenience outlets, auxiliary lighting, office machines and lighting within 8 ft from floor.
- Requires two types of panel boards, one for each system.
- Power supply cannot come from network system; must have high-voltage primary to own transformer bank or a 480-v secondary supply.
- Low-voltage switching of lighting units is limited to 5 amp per relay.

ELECTRICAL WEST

Who Will Be Next ?

THE arbitrary, arrogant and capricious seizure of the steel plants by executive fiat has fearsome implications. When coupled with President Truman's asserted belief that he possesses equal authority to seize the nation's radio stations and free press, the act presents a grave issue to industry and to the country.

Who can deny that, using this ominous precedent as "authority," some politically minded executive in the future might not seize the electric utilities? Or the banks. Or the insurance companies. Or any industry for that matter.

Under the guise of an omniscient and omnipotent benefactor, the government has used the excuse of "national emergency" or "the preservation of national security" during the last two decades to exercise increasing authority and control over the American economy. Curbing this insidious development is a job for Congress. Unless the executive power is curbed, tyranny and dictatorship are closer than we think.

Real Professional Responsibility

ONE of the criticisms leveled frequently at engineers has been their seeming negligence to accept some of the civic and public responsibilities that naturally go with professional standing. They have stood by dumb and unprotesting when projects totally lacking in engineering and economic merit have been ballyhooed and built.

However, all of this may change if a recent development in the Pacific Northwest can be taken as indicating the beginning of a trend. There has been organized in that region the Independent Engineers for Private Enterprise which, according to its Oregon chairman, has been "formed to consider, investigate, and recommend the best instrument for planning and controlling the land and water resources of the Pacific Northwest. It is comprised of a group of 1,400 engineers practicing in the Northwest and does not include engineers in the employ of the federal government or of the electric utilities. This exclusion was deliberate so that our opinion could be expressed without bias. We self-finance our expenses and receive no aid from any corporation or agency."

Here is a fine example of recognition and acceptance of professional responsibility. May the movement succeed and spread.

D-C Testing

DEVELOPMENT of a successful, practical and economical high-voltage d-c testing technique for insulation on large rotating equipment is described on another page of this issue. The technique is significant and important in that it provides knowledge of the condition of insulation not heretofore available. Previously the acceptable a-c tests told only whether the insulation was good or bad. The new d-c procedure, which is based upon highly sensitive instruments developed during the war, not only tells the condition of the winding but also permits an accurate determination of its life expectancy. The technique represents a tangible contribution to maintenance procedures.

Higher Voltages Are Here

THE logic and the economics presented in T. Ingledow's article on the 345-kv transmission project of B. C. Electric, presented elsewhere in this issue, are certain to have a great bearing on the future power transmission developments of the Far West. As distances between power sources and load centers increase, as costs go up and as rights-of-way become more valuable, it is absolutely essential to take advantage of every avenue for economies in transmitting large blocks of power over long distances. As Mr. Ingledow points out, the primary answer is to adopt higher transmission voltages. For the particular situation confronting his company 345-kv was the most prac-

EDITORIAL VIEWS

tical and economical. He and his company are to be congratulated on pioneering the first actual lines of this voltage on the American continent. It is a forward step typical of the West.

Force for Salesmanship

SUBSTITUTION of coercion for persuasion is a sign of psychological failure, an admission of defeat in competition when the idea, the production or the method being proposed has to resort to force to get it accepted. From such a premise then the American Way of Life, the free enterprise way, is in greater danger today than at any time in history. This disintegrating tendency is seeping through all phases of life.

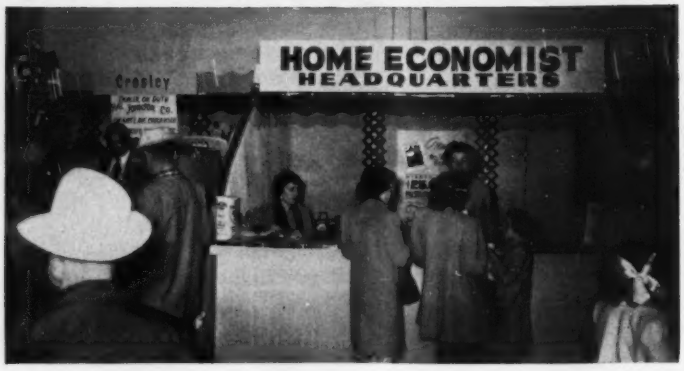
When manufacturers of a product seek or support legislation to force the use of their product, it is a sign of failure to sell it on its merits in open competition. When a union seeks to have the government make every worker join and pay it dues if he wants to live, it is a sign that union has failed to develop benefits that it can sell and has to use coercion to hold membership. When a governmental administration has to seize private industry and property and dictate prices and controls on materials, it is because it has lost the respect of its citizens.

There are examples in every walk of life. This degenerating trend can only be stopped by re-establishment of self-reliance and self-respect. No laws can do it.

MINOR MEMO—In the editor's mail one day last month were four different press releases from the fecund information service of the Department of Interior. Two more arrived the next day. Each gave a different version and carried a different release date of a story about the Harold L. Ickes Memorial Services to be held on the steps of the Lincoln Memorial April 20. The event would probably have passed unnoticed except that four other editors in the same offices also received the same set of releases. All of which brought to mind postal deficits, economy in government, high taxes, etc., etc.

You Can Say That Again

THE electric power industry has long been the main target in a campaign to socialize American enterprise, but the reason why this is so is not generally understood. It was well explained over 25 years ago by Carl D. Thompson, a nationally known socialist prominent in the public ownership movement. Mr. Thompson said: "The movement for public super power is the most vital phase of the public ownership movement. The control of electric power will obviously carry with it the control of the industries of the nation — the control of transportation, of mining and of agriculture." The reasoning behind Carl T. Thompson's views is plain. Once the source of electric power supply was socialized, and the men holding political power dominated it, they could do with the nation almost anything they might wish . . . It is an obvious fact that the friends of socialism in our federal government need to win only once—then they will be in the saddle permanently. That is why they keep coming back each year with a repetition of the same program. If defeated one year, they are always back the next year. The friends of free enterprise, on the other hand, must win every time to survive. That is why the electric power program of the federal government is of importance to every investor and every believer in the American system of free enterprise. The fate of the utilities is only a single part of a national issue. The important thing is that if our industry can be socialized, the precedent will be established for extending the same treatment to other basic industry. The authority and the rights of the state will be destroyed. The federal government will call the tune everywhere and all of us will dance to it.—T. E. Roach, president, Idaho Power Company.



San Diego Springs New

Something new was added to the Spring Fair put on by the Bureau of Home Appliances of San Diego County at its customary former exposition grounds Balboa Park location from April 15-20. This was to make it an exposition of all home appliances and to include for the first time an entire building devoted to electrical contractors and wiring materials. And the idea proved such a good one that manufacturers and distributors of wiring supplies and equipment and the electrical contractors want it to be a permanent feature of all future shows and expositions.

The major show of the bureau is that in late November each year, just before Christmas. The spring fair, during the past two years at least, has been given over to a home freezer and frozen foods exposition. This year, while both freezers and frozen foods received major emphasis, the bureau committee decided to give the entire appliance business the stimulus it needs by making the spring fair one for all appliances, radio and TV sets. It was decided to call it the Spring Fair of Home Ideas.

The recently recognized and greatly energized contractors' division of the bureau decided it was time to show the public some of the things that go into adequate wiring of a home, office, commercial building or factory. So one entire building of the four large exposition halls used for the show was devoted to the contractors' division.

Signs everywhere said. "Your Electrical Contractor Knows." The manufacturers and distributors of wire, metal moldings, wiring devices, fittings, connectors, domestic, commercial and industrial lighting fixtures, explosion-proof fittings, electric heating systems, ventilators and fans, lamps and motors—some 20 or 25 in

Top: crowds filled the halls, especially at door-prize drawing times, afternoon and evening. Center: one of the four large exhibit halls employed, three of which were devoted to product displays of appliances, radio and television sets, the fourth to contractors' division. A meat cutting and packaging for freezing demonstration was in one. Bottom: Mrs. Weston greeting from the home economists' booth

Idea in Shows

all—exhibited wares and explained to a surprisingly interested public the values of these in rendering electric service. One representative of a low-voltage push-button lighting control system reported several sales each day to people preparing to build new homes.

The San Diego Gas & Electric Co. exhibited in the same hall model office lighting with luminous ceiling in contrast to an old type of luminous bowl installation. It also had a display showing methods to light kitchen work counters, sinks, bathrooms, sewing and reading centers in the home. Outside this was a popular game, "Overload the Circuit," by which the story of ample circuit capacity and fuse safety was demonstrated.

The appliance and TV show followed the familiar pattern so successful in San Diego—a free show to all the public, door prizes twice a day, home economists giving demonstrations, the frozen food and locker plant people shown cutting and packing meat, lots of action and selling in spaces uniformly decorated and labeled by product brand, dealers on duty identified by cards, lots of advertising and publicity. Mrs. Samuel Weston, recent winner of the national cake contest of Pillsbury Flour, was a featured hostess along with home economists from eight manufacturers and distributors.

Committeemen responsible for the smooth operation of the show were: Ed Reed, chairman; Lee Bornstein, Gene Cramer, E. W. Meise, Ed Nystrom, George Porter and R. T. Redfield, with over-all supervision from experienced J. Clark Chamberlain, manager of the bureau, and Carleton Bunce, director of the new contractors' division. They estimated that about 125,000 persons attended the show during the six-day run.

Scenes in the contractors' building: Top, an idea of the number of exhibitors of wiring materials, fittings, fixtures, lighting, fans, built-in heaters and ranges can be gained from this comprehensive view. Center, one of the wiring materials manufacturers found much interest in metal moldings and plug-in strip. Bottom, the adequate wiring exhibits of the bureau made a game of "overloading the circuit"

Warming Up for the Elections

A foretaste of how the national political conventions and elections will be tied in with television and appliance promotions was given the West during the past month as the three major manufacturers that are going to sponsor national telecasts of the conventions held distributor and dealer meetings to launch sales campaigns. Philco, Westinghouse and Admiral, as might be expected, each handled the situation differently. Boiled down they outline as follows, with plenty of advertising, fanfare, spectacular detail to go with each:

Admiral

Two Admiral executives, W. E. Johnson, vice-president in charge of sales, and Seymour Mintz, advertising director, came to San Francisco to meet with Admiral distributors from the 11 Western States, April 9. To them they offered 21 new TV models whose prices include the federal excise tax and warranty. As a special to tie in with the presidential conventions, they showed two "Presidential" models—a 16-in. TV set in all-plastic case to sell at a new low of $179.95, base extra at $17.50, and a 17-in. console at $229.95.

From there on the line adds an AM radio in the TV at no extra cost and, instead of price cuts, the excise and warranty are "inboard." Complete mechanization of the production line, said Johnson and Mintz, enables economies to be passed on by absorbing tax and warranty instead of reducing price and dealer margin. The line is stepped up for selling up in $10 steps or differences in mahogany or blonde, with and without AM radio.

A new table model and portable radio line was also introduced. It includes seven table, five clock radios, three portables and a radio-phonograph table model, with prices running from $19.95 to $69.95. One six-tube radio is designed for distance. Dealer discounts in both radio and TV will run a bit higher, Johnson said.

Distributors were coached on the selling program. The main emphasis by Johnson was on teaching salesmen how to sell again, how to prospect for prospects again as was done in the old days. Price cuts, they reminded, only serve to make people wait to see if more are to follow. With extra features and quality to offer, such as the built-in radio, the absorption of excise and warranty, easy conversion to UHF, etc., in the TV line, and flash defrosting in its refrigerators, the dealers are urged to make these sell over price. Mintz also outlined a free home trial deal with a 10-lb steak bonus as a means of finding refrigerator prospects.

The coverage to be given the national conventions and the importance of this public interest in developing the TV business were strongly emphasized. During a press interview they told that Admiral, watching the growth of the Western region as the fastest growing area, intends to compete with local manufacturers. News also was that Admiral has established a laboratory for pure research near Stanford in Palo Alto, Calif.

Johnson Mintz

Distributors represented at the meeting and greeted by Johnson, Mintz and by Harold Conklin, Western regional manager, include: Midland Wholesale of Billings, Mont.; Jensen-Bird of Spokane; Columbia Distributing of Seattle; Lou Johnson of Portland; Walter B. Lloyd of Salt Lake City; Cunningham Distributing Co. of Albuquerque; Arizona Hardware of Phoenix; Herbert Horn of Los Angeles; Admiral Distributors of San Diego; MacCormick Co. of San Francisco and Billings Wholesale of Fresno.

Philco's TV Convention

A convention of dealers in 38 cities at the same time, getting the program by television through a national closed-circuit TV presentation, saved Philco two weeks' time in getting its sales story to some 20,000 dealers. The full hour TV sales program was a well-prepared job, with highly dramatic, terse background scenes and talks from top Philco and NBC executives and newscasters. Philco will sponsor the NBC telecasts of the preconvention, the convention and the election activities in the two national political party campaigns.

The closed-circuit broadcast was a life-sized sample of how it will be done as well as a sales meeting to tell dealers how to make sales from it all. Speakers included William Balderston, Philco president; Joseph McConnell, NBC president; Fred Ogilvie, Philco vice-president of radio-TV; Raymond George, vice-president-merchandising. Also seen and heard were John Cameron Swazey,

Westinghouse's "Ellis in Freedomland" premier notables included Jack Mulhall, Walter T. Baker, Westinghouse district appliance manager; Robert Carson; M. B. Sauer, Wesco, Vernon; and Robert Rockwell. Mulhall, Carson and Rockwell are actors

W. E. Chaplin, Ben Grauer, H. V. Kaltenborn, Jim Fleming, George Hicks, Henry Cassidy and Merrill Mueller.

To capitalize on the publicity, Philco has four "Campaigner" models: a 17-in. console at $259.95 plus tax; a 20-in. at $289.95; another 20-in. fringe area model at $319.95 and a 20-in. console with half doors at $349.95. Four major promotions are scheduled: (1) preconvention to July 7; (2) two weeks during the conventions; (3) after conventions during August, September and October; (4) the election itself, including the returns. Elaborate advertising and display programs, a trip to Hawaii fot salesmen, election guides to be obtained only at dealer stores, and similar promotion material are all part of the big buildup.

J. H. Adams, center, domestic sales department, Southern California Edison Co., accepts annual George A. Hughes award for outstanding achievement in promotion of all-electric kitchens. Dwight R. Anneaux, manager utility division, Hotpoint, makes the presentation for his company, as G. E. Whitwell, awards committee chairman, looks on

Westinghouse "Freedom Fair"

Another sponsor of the national convention broadcasts, Westinghouse, who will ride with the CBS coverage, wrapped all of its sales program, not alone for TV but for all appliances, into a package it calls "Freedom Fair" already started in its dealers' stores and windows. Westinghouse chose a $250,000 color film program, presented to dealer dinner meetings, as the medium to get its sales story across. The opening gun of its $12 million sales drive was a Hollywood spectacular in Los Angeles at the Belmont Theater, March 30. The show then went nation-wide in similar theater presentations. T. J. Newcomb, sales manager for Westinghouse Electric Appliance Division, Mansfield, was at the Hollywood premiere.

For 29 years this electric oven in the Los Angeles Biltmore Hotel has operated without a shutdown, baking 6,000 rolls a day plus huge amounts of pastries. The only replacement in 29 years was one switch. Marcel Ansot, baker, left, was in a similar picture 14 years ago. Xavier Fuchs, bakery chef, is shown at the right of picture

The theme, "Don't meet competition, Make it," was emphasized in the Sam Hayes newsreel (telling about Westinghouse $296,000,000 expansion program and the importance to the company of consumer goods business); the sports short (Mel Allen narrator—top records made in ten sports); and the feature, *Ellis in Freedomland*. A 3-minute coming attractions trailer told of the Westinghouse CBS television and radio coverage of the political conventions, the 13-week get-out-the-vote campaign and election night coverage.

Selling points and getting store traffic also were covered in *Ellis in Wonderland*, in which a dealer was instructed by talking appliances (Hollywood big names were the voices) in an after-hours dream. Store dummies came to life to help in the demonstrations. Dealer helps in the Freedom Fair and suggestions for making use of them were brought out in a closing routine.

The meeting itself was closed with distribution of next morning's newspapers with the Freedom Fair on the front page and with awarding of door prizes to dealers. A Laundromat was top prize.

EMEA of So. California at Culver City Auditorium . . .

Gives 'em Both Barrels

Staged for a double bill for the first time this year, the sixth annual industrial electrical show of the Electrical Maintenance Engineers Assn. of Los Angeles, Veterans Memorial Auditorium, Culver City, March 21-22, was rated, though smaller, more effective and more selective.

The double-bill feature was to combine with the annual electrical show a conference on planned maintenance. This was a new feature and was excellently developed. Registration for the conference was 106 at a fee of $15 each. Subjects covered were planned lighting maintenance, planned equipment maintenance and planned plant electrical distribution maintenance.

The scale of the show was purposely set lower early in the year when it was feared the manufacturers, because of shortage of materials and equipment, would not have so much new to display. Likewise it was held in outlying Culver City, which made attendance more difficult. However, it brought to the show those who were sincerely interested and who gained the most benefit from it. Exhibitors were all well pleased with the selective attendance. It gave them an opportunity to demonstrate only to those with a real interest.

In spite of the uncertain times, many of the manufacturers had new and unusual equipment to display. Improvements in equipment design were noted in many of the booths and a sprinkling of completely new entrants was observed, the association reported.

The Purchasing Agents Assn. of Los Angeles, called upon each year to select the best exhibits, awarded U. S. Electrical Motors Inc., Insulation & Wires Inc., and F. J. Airey Co. the certificates of recognition. The Industrial Advertisers Assn. made the presentation.

The conference headed by Leon Dame, Southern California Edison Co., as chairman and assisted by Emerson Reichard, General Petroleum Corp., was arranged in three panel sessions, the Thursday morning, afternoon and Friday morning of the joint affair.

Planned lighting maintenance had as its chairman Charles A. Blakley, Smoot-Holman Co., and panel members were Charles R. Long, Westinghouse Lamp Division, and Foster Sampson, consulting illuminating engineer.

Planned equipment maintenance had as its chairmen Hugh Day, Westinghouse Electric Corp., and Emerson S. Reichard, General Petroleum. The panel members were E. H. Fincher, Westinghouse Electric Corp.; A. J. Garey, U. S. Electrical Motors Inc.; and M. A. Wise, General Petroleum Corp.

Planned plant electrical distribution maintenance was co-chairmanned by Donald B. Carson, General Electric Co., and Charles Croft, Square D Co. The panel members were John G. Corrin, Pennsylvania Transformer Co.; L. F. Cudlin, General Electric Co.; W. R. L'Hommedieu, ITE Circuit Breaker Co.; and George Moorehead, Kelman Electric & Mfg. Co.

Joseph A. St. Andre, electrical editor, *Factory Management and Maintenance*, New York, addressed the banquet on the same planned productive maintenance theme, making observations of his trip to the Coast and the necessities for a well-organized maintenance program by every industry. His subject was, "The Electrical Engineer in the Plant of the Future."

Those responsible for the show and conference were as follows: Dick Rogers, Ace Night & Day Electric, general show chairman, with committeemen Jack Cochran, Jerry Ellis, Carl Ladenberger, Jack Pyle, William Reeder, Jack Rohring, Morey Sherwin, Ralph Weston and Hal Davis. Also commended were President of the Association George Larsen, Conference Chairman Leon Dame, Publicity Chairman Jack Rohring.

ELECTRICAL WEST

Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

May 1952 ©

In spite of figures saying the public has more spending power than ever, it has safety pins across its pockets and sales are slow--that goes for everything, not appliances alone. In appliances the only item selling in quantity is the home freezer and that is tied up with one of the numerous and increasing food and freezer plans. Even the lifting of the TV freeze has not hiked TV set sales and it is still early for the Chicago political conventions. In brief, selling is hard work and merchandise is plentiful. Prices are starting to show it but even price cuts are not luring buyers. Too many are doing so in all lines of merchandise. Even shows and schools to stimulate sales are not drawing the attendance they did but are very worth-while.

Resistance is high

The factories are reflecting this slowdown by cutting back production and shutting down plants for various intervals until inventory is moved. Their sales departments show jitters by changing distributorships so that you may well wonder, "Who's my supplier this month?" or "What line does my distributor want me to change to now?" None of this really helps, adds to cost and confusion rather than facing up to work.

Uneasy distribution

On the favorable side are: the relaxation of Regulation W on appliance paper permitting lower down payments and longer terms--not an unmixed blessing; the loosening up on materials for more houses to be built; credit for home improvements that can stimulate wanting of new appliances to go with them; spendable income at an all-time high if it can be coaxed out; more factory campaigns and gimmicks to stir sales, plus the heaviest national advertising in all history; more wholesaler activity to step up selling. It is a time for watching operating costs and improving merchandising methods.

What's good about it

Price control, under the circumstances, is somewhat ridiculous and may well be questioned by Congress as the June deadline of the present control law expires. It only maintains a big bureaucracy. Meanwhile OPS has issued supplementary regulation 1, amendment 10, to CPR 7 on special pricing methods for certain chain stores and mail order houses as to service charges: SR 16 to CPR 34 covering wholesale labor warranty services; amendment 3 to CPR 34 for adjustment of ceiling prices for new service sellers. Each is a bit more sensible.

What price?

National Housewares Directory for 1952, published by the Associated Pot & Kettle Clubs, is off the press. It contains 96 pages of manufacturer listings, 122 of brand names and 268 of products; was edited by Olive MacDonald and Osgood Murdock, 1355 Market St., S. F. 3.

Useful guide

Coming attractions

Events on schedule in the West are: Sacramento Electrical Home Show, May 23, 24, 25, at the Memorial Auditorium. Electrical Living Carnivals in Arcata, Paso Robles, Garberville, Concord, Dos Palos, Livermore, Firebaugh, Lower Lake, and June 6 in Healdsburg, all in northern California, under No. Calif. Electrical Bureau auspices. 14 carnivals were held in Jan., Feb., March and April, with average attendance of 400 each. Big Western Living and Home Exposition at San Francisco Civic Auditorium is scheduled for Sept. 27 - Oct. 5. . . Los Angeles Home Show this year will be at Hollywood Park race track in Inglewood, on Aug. 11-22. Los Angeles Electric League is joining the group of construction industries putting on the show this year. . . Summer market at San Francisco Merchandise Mart is July 14-18, with the radio-TV and appliance trade dinner on Wednesday, July 16. . . California Gift Show at Los Angeles is to be July 20-25, while the Western Gift, Toy and Housewares show will be in San Francisco Mart and Civic Auditorium Aug. 3-6. In April there were appliance shows in Ogden, Utah, and Coeur d'Alene, Idaho, home shows in Seattle and Vancouver, B. C.

Full steam ahead

Inland Empire Electrical League is going like a house afire, with an air conditioning campaign being readied for the summer months by the supply and apparatus section; a sales training course in cooperation with the Spokane Trade School; mass promotion campaigns by the appliance section on ranges and housewares in June, refrigerators in July, freezers in August. It is also getting the trade ready for the problems of television. There's a commercial lighting project in the wind for fall. A big membership drive is on and things are looking up.

Freezers and food

Like any idea that suddenly "takes," the food and freezer combination deal is running a prairie-fire course. We erred a bit as to the beginnings of the plan and Better Living Co.'s T. F. Rhoy wrote us (see Letter column) saying his company, organized in December 1949 in Sacramento, was the starter, in April had a branch in Fresno and now has 10 branches, and Rich Plan started in June 1950. Meanwhile the freezer sales were going up and more plans being hatched all over the country. In Los Angeles there were meetings of the Approved Freezer Food Plans Assn. to try to put some order into the chaos but distributors of some of the major lines were cagey about getting mixed up in it. Even the high-pressure salesmen called a meeting to consider an association of their own as insurance to their future jobs. One of the latest entrants is Sears, Roebuck & Co., which not only advertises lower-priced Coldspot freezers but food too. Sears has even introduced the plan in its Honolulu store in a tie-in with a market chain. In San Francisco, George Hornstein of Pioneer Appliance Co. headed a meeting of dealers, bankers, OPS, food suppliers and BBBureau to discuss the entire situation. And in Los Angeles, Lee Adler, former manager of the I-H department of Thomas Distributing, started an advisory consulting service called Freezer Merchandising Corp.

Housewares next

Electric housewares should and will get a big play during the June Bride season for which the Electric Housewares Gift campaign of NEMA is aimed. There are two contests, one for best interior or window display, the other for best retail newspaper ad in several classifications of stores. Closing date is July 15 for submitting pictures or ads to Electric Housewares Section, NEMA, 155 E. 44th St., N. Y. C. 17.

In line for it

Some housewares specials--Proctor offers a deal of ironing board, pad and cover, iron and steam gadget and cordminder for a total of $43 for up-selling stimulation. . . Nesco has a merchandising bar from which to sell roasters. . . Telechron is breaking out in a rash of clocks as gifts for spring. . . Universal has a new automatic iron, the Leader.

Some pretty sensational speakers are lined up for the Pacific Coast Electrical Assn. convention at Hotel del Coronado, June 11-13, many of whom should interest dealers and distributors. It's to be an all-general session convention, no parallel meetings. Outspoken Vivian Kellams on "Trouble, Toil and Taxes," for instance; Hugh Cromer of Allis-Chalmers Co.; George Gadsby, forthright president of EEI and of Utah Power & Light; W. V. O'Brien, G-E vice-president; J. M. McKibbin, Westinghouse vp, on "Impact of TV on Industry"; Webb Theleen, G-E sales manager, a bang-up talk on salesmanship; Ralph Flynn, publisher of Electrical World, "The Economic Outlook for the Electrical Industry"; Ed Hochuli, General Petroleum industrial relations chief, who gives a down-to-earth talk, "Management Must Sell Too." Many more also.

Flash on PCEA convention

Television talk skyrocketed in mid-April when FCC officially defrosted the freeze and set July 15 as a date for receipt of applications for the new channels assigned to cities or areas throughout the country in both the VHF and UHF bands. Hearings on disputed bands requested will begin in July but it is hoped undisputed channels will get quicker processing. DuMont Laboratories announced the sale of $5½ million in broadcasting equipment in 14 days prior to the defreeze, 32 transmitters, 23 for VHF, nine UHF. In fact, DuMont has a complete program to help potential broadcasters get going quickly. . . Graybar in an agreement with Federal Telecommunication Laboratories will distribute its broadcasting equipment, including microwave links between cities. . . Les Hoffman opined that the West has had a lesser coverage than the East and deserves quick action to get stations for many regions without an TV and others with only one station. . . Salt Lake City's KSL-TV mountain-top transmitter is delayed until September. . . John Poole, who has operated experimental UHF station in Los Angeles since 1949 on channel 22, has asked for that channel to go with his station KBIG.

Unfreeze TV

More TV makers went inboard on their pricing--putting the Federal excise and warranty in the list price--Admiral, Hoffman, Scott, CBS-Columbia and others. . . Emerson guaranteed its dealers price protection until October; DuMont through July 13.

Inboard pricing

Hoffman has added 21-in. table models to its 1952 line of TV sets, priced at $349.95 in mahogany, $10 more in blonde oak or maple with matching stand for $16.95. . . Gough-Douglas Co., Los Angeles, has a new idea in TV receivers, 24-in. Douglas Chairside Control TV receivers, made by D. J. Roesch Co., with the picture console unit separate and a chairside control end table, entirely electronic in operation; it also contains a pretuned FM station on the channel selector for mood music alone; sells for $595. Gough-Douglas has direct factory franchises available to selected dealers. . . Magnavox has introduced into its top bracket line a Belvedere 3-way combination with 21-in. cylindrical picture tube at $695. . . Majestic division of Wilcox-Gay announced a new 20-in. table model without sharp edges or corners to sell at $269.95 with removable Lucite front shield for easy cleaning. Has a mahogany veneer cabinet.

Some new models

San Diego Bureau of Home Appliances initiated a new idea in cooperation with the city schools, getting local distributors to loan sets to all the schools for a two-months experimental educational daytime program the school system will put on the air to instruct classes in each school simultaneously. Distributors loan, install and service the 20 sets. . . DuMont carried on a one-day educational experiment for Montclair, N. J., State Teachers College April 30 over UHF. The college produced live shows viewed in 12 schools. . . "Listen to Mr. Tee-Vee" is an 8-page comic-style booklet EEI has for educational distribution.

Education on the air

This moving picture

The distribution scene is always changing--Leo J. Meyberg Co. will now be distributor in southern California for Hoover products, the special cleaner, iron, hand cleaner and floor polishers, but not the regular electric cleaner that is sold direct through dealers. Meyberg Co. is also distributor exclusively in southern California for Hobart Kitchenaid dishwashers. . . W. A. Somers, a department store man from Peoria has been made vp and general manager of Electrical Equipment Co. of Arizona, Kelvinator, Leonard, Bendix home laundry, Zenith and James distributors. . . Radio Specialties Co. at 1956 S. Figueroa St. in Los Angeles celebrated its 20th anniversary with a remodeled and enlarged warehouse and display store. It has many display features new to the parts business, says S. K. Painter, president. . . Admiral and MacCormack & Co. have parted and Admiral is setting up Golden State Appliance Distributing Co. in San Francisco at 274 Brannan St., with Harold Conklin as vice-president and general manager. No successor has been announced for his post as western regional manager. . . Kaye-Halbert has opened a factory sales and service branch in San Diego, with Al Faherty in charge and William Jellerson in charge of the factory service branch, which includes installation for dealers. . . Ed Schindeldecker, former Detroit manager for General Mills home appliances, has been made the Pacific Southwestern district manager in Los Angeles. . . Pacific Telecoin Corp. has been appointed the Quickfrez distributor in San Francisco area. The line includes refrigerators and freezers. . . Appliance Supply Co. of 591 Sixth St., San Francisco, has been appointed northern and central California distributor of the Montag electric and coal ranges, made by Montag Stove & Furnace Works, Portland. . . Russell & Co. in San Francisco Mart has been made General Floorcraft floor machine distributor in northern California and Ray Elggren Co., 428 S.W. Temple, Salt Lake City, the Utah and southern Idaho area. . . Coolerator has appointed Conrad Platt's Century Distributing Co. of 1335 S. Grand Ave., Los Angeles, as distributor for seven counties in southern California. . . . R. J. McNeely, former Hoffman vp and sales director, is now factory rep. for Belmont Radio Corp., makers of Raytheon sets, for 11 Western states, with offices in Los Angeles. . . Capehart has named True Distributing Co. of Spokane as eastern Washington and northern Idaho distributor. . . W. J. Lancaster Co., San Francisco, is northern California distributor now for Uprite Freezer made by International Products Corp. . . And Graybar has been made distributor of Capehart in Los Angeles, Long Beach and Phoenix. It formerly had the Sylvania line. Gold E Distributors now handle the line in San Diego. Capehart was formerly handled by Ray Thomas Co., now distributing the CBS-Columbia line. . . Mike DuBrow has left Sparton.

Helped

A. C. McMicken, who retired after 49 years with Portland General Electric Co. and for 40 years was its general sales manager, saw the kwh cost of electricity drop from 18¢ in 1902 to present-day 1.29¢ and average kwh residential use climb in his company to 5,543, one of the nation's highest. C. W. Brissenden succeeds Mac as sales manager.

Celebrates

Gordon Wilkins and H. A. Sperlich, president of Ironrite Ironers, and W. R. Dabney, Ironrite vp and gm, and their wives were welcomed back from Hawaii by the opening of Wilkins new showrooms at 2135 E. 7th Place, Los Angeles. Wilkins also displays there Hamilton dryers, Chambers ranges, Kitchen Maid and Geneva kitchens.

Appointments

Ward Products Corp., makers of TV antenna, has appointed G. S. Marshall Co., Pasadena, as representative to the southern California, Arizona, New Mexico and Nevada area. . . R. D. Schwalb Co., Sentinel radio distributor in northern California and now Universal Electric Appliances, moved to larger quarters at 298 8th St., San Francisco.

Loiseau Cryder

Wilson Heffelman

Bullock Ashworth

Television Dominates RMEL Meeting

Television was the principal topic of discussion at the spring meeting of the Rocky Mountain Electrical League held in Denver, April 20-22. In fact, two entire sessions and half of a third were devoted to problems that television would pose to the various branches of the electrical industry when TV comes to Denver the end of this year or early in 1953. Such interest and concern, only natural, since the Denver service area with 500,000 people was caught in the freeze and, with the great strides made during the past few years, TV is expected to strike with a terrific impact. The electrical industry wants to be ready and is wisely finding answers to problems well in advance.

TV Interference

Utility members of the league wanted to know all about television interference. Experience of Albuquerque with one station and Salt Lake with two stations was drawn upon. Walter Dolde, Public Service Co. of New Mexico, said that some trouble had been experienced with voltage variation on the feeder serving the TV transmitter because of other loads on the feeder. This had been fairly satisfactorily solved by the station installing a voltage stabilizer. Low customer voltage has been a source of complaint. The picture shrinks as the voltage goes down and is lost entirely at voltages of 100 to 105. Reinforcing lines is the only answer to this problem. Thermostatic appliances, arcs and loose line hardware were other causes of complaints.

Reporting for Salt Lake City, W. A. Huckins said that interference had been no particular problem. His company, the Utah Power & Light Co., requires the dealer who sold the set to screen complaints before the power company will investigate. Walter Heston, ELECTRICAL WEST, said that this is the practice also in the Los Angeles area with two million receivers and that in the San Francisco area, with 850,000 receivers, the power company does not investigate TV complaints at all, dealers handle them all. He further said that with the greatly increased power or sensitivity of present-day receivers, and greatly increased power of transmitters in immediate prospect, the interference would become even less of a problem.

Revenue from TV

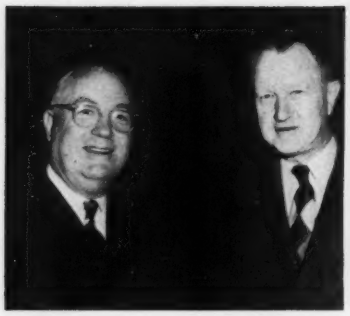
Utility operators of the Rocky Mountain region wanted to know how much additional revenue could be expected from television and how much residential demand would be increased. Several gave their views and the questions were answered more by opinion than from actual experience. Consensus was that the demand would be increased little, if any. Reasoning behind this is that the radio will be off and less lighting is used while television is being viewed. Present TV receivers range in wattage from 180 to 300. Offsetting this, however, it was pointed out that the trend is strongly in the direction of 21-in. or larger screens, and that with these larger and more powerful sets, falling in the higher wattage bracket, and with brighter pictures that require no reduction in normal room lighting, some increase in residential demand could be expected.

In the matter of revenue, it was agreed that television would increase residential consumption some and improve load factor because of daytime use of TV and perhaps longer usage hours in the evening than radio. Huckins said that checks on a few receivers would indicate that TV sets might use 30 kwh a month.

Dealers' Problems

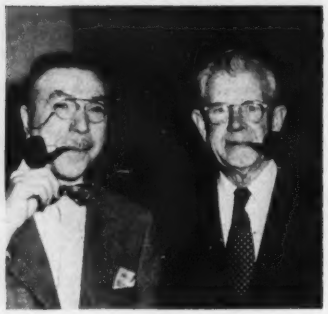
Problems of the dealer came in for a full round of discussion. These resolved themselves into antenna installations and training of service men. The industry of Denver and George McCormack, chief building inspector, City and County of Denver, entered the discussion, apparently convinced that a permit should be taken out for antenna installations and an inspection made to safeguard the public. It was felt also that perhaps licensing of personnel installing antennas should be required.

After a full discussion of the subject it appeared that these considerations were somewhat altered. It was brought out that there are only about three cities in the country where there are any mandatory requirements on antennas and that these have not been rigidly enforced; further, that the problem had arisen in fringe areas only, where high masts had been erected in an attempt to receive a signal. One person spoke against imposing any regulations and another suggested that permit and inspection be required only on those installations where height of the antenna exceeded



Buck Johnson

Thomas Burdick



Adler Vaughan

six feet above the roof of the building on which it was mounted.

Training of servicemen for television appeared to be amply provided for in a course to be set up in the Opportunity School, which is a part of the Denver public school system. The Rocky Mountain Electrical League asked that this course be set up and Howard L. Johnson, principal of the school, is cooperating fully in its establishment. An instructor has been engaged, instruments and equipment are on order, and the course has been advisedly timed to start in about 30 days. The industry and the school do not want to train men too far in advance of coming of television and have them leave to go to some other area that already has it.

Other Subjects

Deliberations of the engineering, accounting and information committees were somewhat dwarfed by all the furor over television, but they did find time to pursue some of their normal functions. Other than TV, the engineering committee took up materials problems and the use of aluminum conductors. H. H. Tureman, Southern Colorado Power Co., reported no trouble with served joints of aluminum to aluminum and copper to aluminum after several years of service. It was pointed out, however, that the climate is very dry and that this practice probably could not be followed elsewhere. All of those who discussed use of aluminum, including manufacturers, agreed that about the only problem was a suitable line of hardware and accessories and close supervision over sags and tension and the use of an antioxidant on all taps and joints. George Phillips, Alcoa, reported that his company is actively engaged in the accessory problem.

Information Committee

The newly formed information committee got off to a good start under Chairman W. L. Breslin. Work of the committee will follow along the general lines of the national PIP group, on a local basis. An attempt will be made to interest all members of RMEL in the national program with the information committee acting as a clearing house for feeding material to league members. Information is in the form of movies, handout pieces, flannel-board presentations and speakers' programs, designed for public or employee groups.

Accounting Committee

The accounting committee held its meetings in the form of panel discussions. These dealt with customers' office procedures; service connects and disconnects; customers' deposits; collections; billing and new customer office procedures. Harold Rust, Colorado Central Power Co., reported results beyond expectations after a year's experience with post-card billing, no customer deposits and estimated readings on disconnects for final bills. Savings were considerable both in time and money and the department was able to release one employee for other work.

In discussing collections, H. M. Doud, Western Colorado Power Co., stressed the public relations angle, especially the caliber of men assigned to collecting. Morris Smith, Home Light & Power Co., discussed his company's use of post-card billing. A show of hands indicated that seven other companies also used post cards. Some savings are canceled out by the increase in postal rates.

Clifford M. Melby, Public Service Co. of Colorado, told of the use of a new 28-day timecard, distribution of productive time and lost time, and average rates per hour. He said use of the new card had reduced entries 36%. Stores *without* a storekeeper was discussed by Harry Adler, Arvada Electric Co., and stores *with* a storekeeper by W. J. Benning, Southern Colorado Power Co.

Dolde Porter

Armstrong Bendekovic

Huckins

Haines Breslin

Law Koch

General Session

The conference had opened with a report by President J. W. Cryder on the position of each member company as regards adequacy of power supply and manpower. All were in good shape as regards power supply and only one was having any manpower problems. Activities of the league were reviewed and accomplishments noted in all branches of service to members. Cryder said that Colorado is the only state where home-rule cities fix rates and that voters can hardly be expected to be intelligent on rate matters with this situation. It is more reasonable to have the state public service commission fix rates, and a measure to bring this about will be submitted to the voters. He said that several utilities of the region had entered into wheeling agreements with the government for federally generated power, but the government can be expected to continue its determination to socialize the power industry.

John E. Loiseau, president of the Public Service Co. of Colorado, in addressing the opening session said that the power companies in the intermountain area have a community of interests separate and apart from regions to the east and the west and are currently making a questionnaire survey of loads up to 1965 and 1970 to guide them in future development programs. Like Cryder, he favors state-wide regulation in Colorado, instead of regulation by some cities, as at present.

Loiseau spoke strongly against the unfairness and inequity of the preference clause and said the government spends millions for transmission lines to effectuate the preference clause. Municipalities and REAs do not favor the preference clause and their own sense of fairness prevents them from demanding preference to federal power. He said the government power program is not directed at the private utilities alone, but municipalities as well.

Higher costs and inflation make necessary an increase in rates, declared Loiseau. The dollar is not getting the break in the utility business and, if utilities are to be kept sound, they must ask for higher rates and stick to it. He feels that utilities are derelict in their duty to keep themselves sound and discharge their obligation of rendering good service, if they do not ask for a reasonable increase in rates upon granting an increase in wages.

Attendance at the conference exceeded previous meetings. Registration was 275, and 310 attended the banquet.

IES

Illuminating Engineering Society sections and chapters during the past month heard speakers as follows: **Spokane Chapter,** Samuel G. Hibben, president of IES, at its March 25 meeting; and Louis Batchelor of the local newspaper on "Know Your Industry." **Oregon Section** heard a report on the 1952 regional conference at Victoria from Dan Webster, T. W. Fitch, Walter Potter and Jerry Collins on April 9. **Utah Chapter** heard Arthur W. Segil of Segil Electric & Luminous Ceilings Inc. in Chicago tell of Acoustical-Luminous Ceilings —an Architectural Milestone, on March 24. **The Rocky Mountain Section** also heard from Segil at its March 25 meeting and on April 10 Theodore Seargent on "Rural Applications for Lighting." **British Columbia Section** elected a slate of officers for next year at its March 13 meeting, naming P. A. Donnelly as chairman, D. S. Gordon as secretary-treasurer. At its previous meeting it heard an interesting discussion by Dr. E. A. Kidd, optometrist, on the functions of the eye. Dr. Kidd felt that lighting engineers should be mainly concerned with elimination of brightness contrasts and did not feel that low levels of illumination were physically injurious to the eye. This was questioned by those present. **Northern California Section** broke up into three groups to visit the three television studios in the San Francisco area on April 10. **Southern California Chapter** held a joint annual meeting with the American Institute of Architects on April 2 at Rodger Young Auditorium, Los Angeles. H. L. Wollman, research and consulting engineer, spoke on "Advantages of Integrated Ceilings with Lighting in New Construction" at the study club meeting, and on the regular program of which Roy E. Dahlin was chairman of the evening the "Architectural Students Lighting Design Competition, 1952" awards were presented.

Northern California Section meeting May 8 had as speaker Elizabeth Banning, color consultant, whose topic was "Modern Color Trends." L. H. Markwood, advertising manager of W. P. Fuller Co., also contributed to the discussion. S. M. Blacksmith, chairman of the section, presided. It was ladies' night.

Electric Clubs

Among electric clubs electrical topic speakers included: C. H. Wood, Pacific Coast agency and specialties manager for Westinghouse Electric Corp., addressed the **East Bay Electric Club** in March on "Energy Is Our Business." Horace Zimmer, manager, field sales, apparatus division, General Electric Co., was the speaker March 17 at the Los Angeles Electric **Club.** His topic, "Our Electrical Future." The **Electric Club of Oregon** heard E. D. Mairs, works manager, Vancouver Aluminum Co. of America, explain cable making at Vancouver. **San Diego Electric Club** heard John X. Hutchings tell of electrical installations and distribution systems in Korea April 5.

NISA

NISA's 19th annual convention in Chicago, April 20-24, had both members of the firm of Larsen-Hogue Electric Co., Los Angeles, on its program. William Hogue was on the forum on general management Monday, April 21, and George Larsen on the forum on rebuilding electrical equipment on Wednesday. James R. Horton, Daley Electric Co., Phoenix, was on the latter forum also.

Sherwin Jacobs

McNab Gustafson

Hammond Rudkin

Job Techniques Studied in Joint Meet

Ways to improve techniques and to do the kind of job required today were brought out in hard-working sessions at the joint spring conference of the PCEA Administrative Services Section and the PCGA Customer and General Accounting Section, held at the Hollywood Roosevelt Hotel, April 17-18. Human relations and their importance were emphasized in two luncheon talks.

The program was planned by Dexter Stoner, Coast Counties Gas & Electric Co., and R. F. Ogborn, Southern California Gas Co., co-chairmen. Vice-chairman H. L. Moore, Southern California Edison Co., pinch hit during the sessions for Stoner, who was called elsewhere by business.

E. D. Sherwin, PCEA president, and W. M. Jacobs, PCGA president, attended, and welcomed the delegates. Also attending were Victor W. Hartley, PCEA managing director; Clifford Johnstone, PCGA managing director, and J. E. Kern, assistant manager of the PCGA.

Selling Ideas

Since everything we have or will get — material possessions, security, happiness — has to come from or through other people, the ability to deal with, understand and persuade those people is the best tool we can have, Edward S. Hochuli, manager of industrial relations for General Petroleum Corp., brought out Thursday noon in a talk on Selling Ideas.

With aid of a flannel board he showed that two skills are necessary: (1) knowledge of how other people think; (2) ability to do something about it. Questions in all people's minds every time anyone tries to sell them are in this sequence: (1) Shall I bother to listen? (2) What can this guy do for me? (3) Is it worth while and can he deliver? (4) Why can't I put it off? The fourth, according to Hochuli, is probably the most important and certainly the most frequent.

The salesman's job is boiled down to his ability to answer these questions. If he puts his listener into four successive frames of mind, he gets always in the same sequence: (1) attention; (2) interest; (3) desire; (4) decision.

"Shall I bother to listen," is a question that deals with a man's heart, not his reason, Hochuli pointed out. Ways to a man's heart are through mood, mutual interest, manner, service, appearance, a compliment — things that will bring liking, regard, respect. Gaining respect and liking doesn't sell in itself, but without it the other part of selling is impossible, so it must not be over or underdone, he warned.

The other three questions deal with man's mind and pointing out benefits, not as we see them, but as the listener will see them, is the only true tool for answering them, Hochuli thinks. He warned here that sales fail sometimes because the listener exercises his American right to call things as he sees them.

He pointed to three kinds of selling —up, down and horizontal. Selling up is selling our ideas to our company, selling ourselves in many ways. Selling down is from supervisor to employee. Horizontal selling is selling the customer.

No one can sell anything on a continuing basis unless he goes about it with honesty and sincerity of heart, Hochuli warned, because people are expert at detecting sham or deceit. The two chief characteristics he would look for in building a sales organization are tolerance and sincerity. The acid test of salesmanship is to listen to objections that are wrong and to understand the other person's point of view, he believes. He would take stumbling words and a man who knows less about his product, if he is honest and sincere, not just able to act so. No trick or device will substitute.

In closing, Hochuli pointed out that survival of the free enterprise system depends on the way it is represented by those who are trying to sell it. "If you are a warm, human man, then you represent a system that is warm and human and to be kept. If the listener feels you are cold and indifferent, then you represent something to be changed; if greedy, insincere, you represent something that is to be abolished."

Human Relations

A human relations program based on the premise that people are individual and want to be treated that way was described at the Friday luncheon by Malcolm Macurda, personnel relations supervisor, Pacific Telephone & Telegraph Co. Although

sometimes facetiously labeled "Charm School," the program objective is not to remake the personality of the leader. Rather it is to outline through conference a series of rules governing human conduct so that supervisors can get through barriers and better handle the people under them.

Underlying philosophy of the Bell program is an attempt to create in employees the desire to do the best possible job and gain the greatest possible satisfaction from it. Paternalism does not solve the problem. Macurda pointed out, neither does the attempt never to make anybody sore.

The Bell course runs one day a week for eight weeks. The leader is given a summary of each lesson after it is completed so that he cannot read in advance. Application projects are a part of the program. Leaders are encouraged to bring in the difficulties they couldn't solve, not the happy ending cases. Situations are discussed, then taken back on the job to be worked out.

Instead of criticizing an employee for behaviour, leaders are encouraged to look at the factors that give rise to that behavior. This is not a soft approach, he emphasized, because, if the unsatisfactory condition cannot be overcome, remedial action must be taken. Management still has to manage, he stated.

Individual differences in personality, intelligence, physical traits and their importance in assigning work are brought out first. The second lesson is on motivation, the wants and needs that impel people and satisfactions for these basic drives.

The third lesson is on frustrations, barriers between desires and their attainment. One of the commonest is the boss but there are others, such as physical and personal barriers, education, tools.

Fourth come attitudes, since one of the most important things today is a cooperative work team. Persons tend to gravitate toward those with the same attitude; it gets down to such simple things as whether the boss says good morning, then goes to bigger things such as the way he plans jobs.

Next are interrelations between people. The desire to conform is a terrific force and it is easier for the supervisor if he has group pressure with him.

Then come interviewing and counseling. Leaders are urged to be good listeners, since a person who is allowed to talk often solves his own difficulty.

The final session is on leadership, with three approaches: (1) autocratic; (2) laissez faire; (3) democratic. First can be benevolent but is leadership through fear. The second emphasizes they; the third emphasizes we. All three have their places but the third should be used most often, he advised.

Development of Unit Costs and Manpower Standards

James T. McNab
Central Ariz. L&P, Sponsor

Ever-increasing operating costs call for additional statistical tools to measure performance with other utilities and to compare results between geographical subdivisions or departments for greater efficiency, it was pointed out. Approach to the problem involves: determining where and how operating costs can be reduced; selection of and defining units to be measured; volume of units to be used to determine "unit measure"; method of arriving at unit costs; type of organization, reports to be used, staffing policies and administrative controls; type of business, costs, density, methods and procedures.

Although the problem is difficult, it is worth-while, the discussion brought out. One company following establishment of manpower standards for clerical work in its commercial offices (no attempt was made to compare production of employees doing like work), was able to reduce personnel by approximately 10%. This was accomplished by shifting people to other jobs as vacancies occurred so that no employees were dismissed. When major changes in operating procedure occur, the company revises its manpower standards to conform. It was pointed out that such a program also has proved valuable in justifying additional manpower requirements as customers were added.

Purposes of measurement in establishing a time study program in clerical work are to: (1) establish time values; (2) assign equal amount of work; (3) evaluate work performance; (4) compare methods of doing work; (5) judge work performed impartially; (6) determine manpower needed for the job.

Items to be included in the mechanics of a time study program: (1) elements of work — work connected directly or indirectly with the job; (2) unit measured—basic item represented by each element; (3) production unit—that which can be counted to record volume; (4) number of occurrences—the number of times each element occurred; observed time consumed in performing total occurrences of each element and speed factor; (5) normal time—developed by assigning speed factor to each operator's total observed time; (6) normal time per unit—total normal time for each element is divided by its number of occurrences; (7) effort allowances—time for relaxation and personal needs; (8) work unit per unit measured — application of the effort allowance against the normal time per unit measured; (9) frequency of occurrence; (10) work unit per occurrence and work unit per production unit—work unit per unit measured times frequency of occurrence.

Do's and don'ts for staff in carrying out a time study program: (1) have a complete understanding of the job to be studied; (2) make contact through top supervisors; (3) carefully examine and test all suggestions regarding methods; (4) be understanding; (5) work in harmony; (6)) don't

Moore Hochuli Olpin Ogborn

be high hat; (7) don't be too impatient to get results; (8) give credit to supervisors for accomplishments; (9) make every effort to explain all activities.

Modern quality control can be beneficial in maintaining quality of clerical work, is practical in comparing performance of workers doing similar jobs and, when reasonably accurate, implies reliability without excessive costs, it was pointed out. Modern quality control has returned its costs several times in manufacturing plants but is rare in the clerical field, it was stated. Since mention of clerical quality control raises the question of how quality is determined, it was emphasized that quality control is of little value unless top management agrees on what are good or bad work results and decides the form of inspection, who the inspectors shall be and the standards against which they shall inspect.

Although in applying quality control some people think in terms of inspection to accept or reject each batch of work from each clerk, efforts to lessen errors appear more logical, the discussion brought out. Errors may be classified into "systematic" or "accidental." Systematic errors result from lack of understanding as to what is wanted and a tactful inspector can do much to eliminate these misunderstandings without need for disciplinary pressure. If the error is accidental, the inspector merely records it. Control of accidental errors is solely the supervisor's job, although factual measurement provided by the inspection findings usually is quite an effective quality control.

Many tables have been worked out to show how large a sample is needed for each different acceptable quality level. The purpose of inspection should be to aid the supervisor in knowing what quality level is being achieved and to provide data on kinds and types of errors that will aid in controlling quality. It was pointed out that 100% inspection is uneconomical, unless it is necessary to sort out or correct all errors. Statistics give a means of using sampling to find out the probable quality level and will show the uncertainty of making judgments from small samples.

In use of statistical quality control, clerical work differs from machine shop operations in two important ways: (1) in clerical work the type of error may be more indicative and important than the knowledge that the number of errors has exceeded a control chart limit; (2) clerical work does not usually vary greatly in quality from day to day except for systematic errors. Although a worker may do very poor work one day and very good work the next, the magnitude and frequency of these changes are very seldom of great importance. Therefore, if there are adequate provisions for elimination of systematic errors, a very small sampling may be sufficient, it was stated. The big danger with small samples is that changes in the number of errors from sample to sample may be considered as representing corresponding changes in the entire work, the group was warned.

Although nearly everyone is aware of the problem of trying to judge several thousand items by looking at only one or two pieces, the number of errors from sample to sample because of sampling variation is not so well understood for ten or even one hundred, it was brought out. Sufficient volume to be representative should be determined.

Centralization vs. Decentralization

H. C. Hammond, So. Calif. Gas, Sponsor

That the general trend in public utility accounting is toward centralization was shown in this group discussion. Growth and expansion of Pacific Coast utilities have demanded greater accounting control and have brought into use the functional accounting system to supplement the requirements of regulatory commissions, it was brought out. To attain greater accounting control, the trend might have been toward decentralization had it not been for the availability of tabulating equipment.

Handling of detailed records maintained by the plant, pay roll, disbursement and stores accounting sections of the participating companies were discussed.

One of the larger companies is centralized for its metropolitan divisions and to a large extent decentralized in its suburban divisions in all sections discussed. All other companies are completely centralized in stores accounting controls. Only one of the companies is completely decentralized in method of accumulating, analyzing and recording plant accounting costs. Another company has only its analysis work performed in the divisions, and the other four are completely centralized with respect to plant accounting.

The larger companies maintain contingent funds in division headquarters for payment of local bills with stipulated limitations. All companies pay larger invoices from the general office. Six companies prepare pay checks in a central location and four, including one of the largest, also compute and prepare pay rolls centrally. Another large company is partially decentralized in pay roll preparation, and one company computes all division pay rolls in its division offices.

While it is generally recognized that centralization has certain economic advantages, it was brought out also that the larger companies have many problems in carrying out such a program. These generally pertain to: (1) transferring and absorbing personnel; (2) dealing with complaints from a public relations standpoint at the time of such transfer; (3) providing office space at the central location.

Right-of-Way and Land

H. M. Gustafson, PG and E, Sponsor

Attendance at this session made it necessary for the group to move to a larger meeting room; discussion was lively and keen interest in another joint conference was expressed.

Allen L. Cleveland, Southern California Gas Co., discussed buying real property and zoning problems; and brought out the complexities of purchasing real property for utility use and of dealing with planning commissions. In a recent southern California case, purchase of real property was connected with securing of a special use permit. The site chosen was found to be in a restricted area but, by proper screening and landscaping, the company got the permit. In the discussion, it was agreed that zoning of station sites is one to be given special consideration; that, in any event, it is better to stay with the original location than to move from one site to another at the direction of the planning commission.

Selecting a route for utility lines and acquisition of land rights were covered by John J. Burton, Coast Counties Gas & Electric. Burton outlined the following 10-point plan for selecting a route for utility lines: important factors, maps, preliminary reconnaissance, aerial photographs, final reconnaissance and proper location, preparation of engineering detail, progress records, analysis of problem, owner contact, follow-up. He pointed out that in view of the many obstructions today, study should be given straight-line construction. He indicated that, because of construction costs, field engineers have recommended that wells be purchased and redrilled, barns and houses

moved, rather than relocate the line.

Burton spoke also on obtaining land right following location of the lines and stated that it is desirable to acquaint the property owner with all the terms of the agreement, whether written or verbal. It is important that memoranda be made on all contracts and passed along to construction forces, he said, and after a line is built, construction damages should be settled promptly. Complete details on all special problems should be available to the right-of-way, construction and claims departments, he stressed. Discussing method of payment for right-of-way easement, it was generally agreed that, in open area lands, payment should be made on the basis of 30 to 50% of actual fee value.

Talking on use of joint easements with telephone companies, Ray K. Corwin, Coast Counties Gas & Electric, pointed out that joint use for distribution or service to individual customers has become common practice. It improves the appearance of the customer's property and saves time and money for the companies. Corwin encouraged companies to work out a schedule of costs that would be equitable to both utilities. It was agreed by all representing electric companies that a revision of existing method of cost schedules should be discussed at the next conference.

A. C. Cooke, Southern California Edison, in a talk on inspecting, leasing and maintaining rights-of-way, advised that attention be given to inspecting utility-owned lands after facilities are placed. His experience indicates that, after tower lines are installed, adjacent owners tend to use the utility land for many purposes. Trash dumping and farming without permission are the most common uses and present the biggest headaches in working out the matter with the adjacent owner. Where lands are available for farming purposes, Cooke prefers to set up a special group of men to handle the contacts rather than give them to other departments for handling. This procedure gives the right-of-way and land department better control, especially on the overall policing of its leases, he feels, since maintaining rights-of-way by designated patrolmen is an every-day job, and something new comes up every day that must be settled in the field.

Fee ownership in lieu of easements was discussed by P. E. Wilcox, PG and E attorney. He stated that the owner of the underlying fee has a right to use his land for any purpose that does not unreasonably interfere with the exercise by the utility of its rights under the easement. Unless the interference is so great as to be a matter of law, the question of what is "unreasonable" is to be answered by the jury, and that answer is likely to be entirely different from the one the easement owner would give. Further, it is usually not possible to require the owner of the fee to remove a building from a utility easement once the owner has spent any extensive labor or money, even though the grant contains an express building restriction. The only adequate protection for main transmission lines in improved areas is fee ownership, which gives the utility owner absolute control of the land including, when needed, right to fence.

T. Hume West, Pacific Lighting Gas Supply Co., first covered three unusual right-of-way cases. The first contained a relocation clause that Los Angeles County, as successor to the grantor under a road easement, attempted to exercise; the other two dealt with pipe line rights-of-way that were not secured originally because of title defects. Many years after installation of the pipe line, it was decided to purchase the remainder fractional interests and improve the right-of-way so that the company in future could claim it had a good and valid right. This procedure was followed because the company is not a California public utility, he said. The second phase of West's talk covered a recent franchise tax discussion, that of Los Angeles County vs. Southern Counties Gas Co., wherein the county attempted to overthrow the so-called "Dinuba Case" method of computing franchise taxes.

F. J. Van Lohn, Southern California Edison, discussed the difficulties of relocating utility facilities because of the State Highway Department's vast expansion program. His discussion was mainly on the method of handling different jobs that were forced upon the utilities through freeway plans. He showed highway maps with typical drawings of utility line relocation in the southern area. It was agreed that each utility has its problems in this field and that everything possible is being done to cooperate with the state highway program.

The meeting closed with a panel discussion on present-day appraisal methods conducted by George L. Schmutz, Los Angeles realtor and appraiser, assisted by Ray W. Long, PG and E, and H. W. Swanson, Southern California Edison.

Tabulating Equipment Utilization
C. N. Rudkin, So. Calif. Ed. Co., Sponsor

Informal discussion centered on machine room management, centralization and mechanization of accounting activities and preparation of statistical and managerial reports, rather than on the technical aspects of individual machine operations.

R. O. Cross, Southern California Edison, discussed organization and management of a machine accounting group and outlined methods for selection, training and advancement of personnel.

Physical layout of machinery and equipment, determined with the aid of templates, should be planned for accessibility and maximum productivity, it was stressed. In determining space requirements, Cross advised allowance for the expansion of mechanization that is sure to occur when its benefits have been demonstrated.

Cross explained how manuals should be prepared for accounting machines, key punching and controls. He emphasized the importance of continuous evaluation and improvement of machine room procedures and recommended periodic check as to whether the reports produced were actually required.

V. N. Hansen, Edison, explained machine room procedures for handling pay roll. He described the use of weekly time sheets by each employee to account for hours worked and to summarize the accounting distribution. It was found that the majority of companies represented favor the biweekly over the semimonthly pay period, with deductions spread evenly. Reconciliation of the biweekly pay roll with the monthly accounting period was explained.

In general discussion, it was pointed out that integration of construction in progress cost analysis with the plant budgeting system was readily adaptable to machine accounting. In addition to preparation of machine reports that detail charges to work orders, work order progress reports should be prepared to give a summary by work order of accumulated expenditures to date and a comparison with the amount of the budget approval. On closing work orders, it was believed that distribution work orders are sufficiently routine to permit machine preparation of the transfer; that general work orders do not lend themselves to mechanization and should be analyzed and closed individually. It was recommended that the punched cards used in preparation of construction work in progress

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reports be used also for preparation of continuing property records.

Meter reading by mark sensing and mechanization of the service order routine was covered in detail by W. A. Shields, Tacoma City Light, a pioneer in this field on the West Coast. Use of a punched card as a bill form had been introduced successfully by several companies represented, with favorable customer acceptance and considerable saving in machine room processing.

Additional savings had been effected by use of the card-punching Addressograph. It was generally agreed that the amount of processing required to produce complex billings with tabulating equipment was not justified at present but that approximately 90% of the industrial billings could be produced by machine.

A wide variation in extent of mechanization and centralization in handling customers' accounts was revealed. Experience ranged from a completely manual cash posting and account receivable system to a completely mechanized system, governed largely by the size of the area served. If the system was widespread, it appeared that centralization and mechanization of accounts receivable was not readily adaptable. It was agreed that revenue statistics could be prepared advantageously as a by-product of a mechanized billing procedure. It was also thought that meter history should be recognized as an accounting record as well as a record of meter location and performance.

A discussion on recent developments in design and trend in electronic and other machine room equipment closed the meeting.

IAEI

Three more chapter meetings were added to the itinerary of Robert A. Peterson, technical assistant secretary, International Association of Electrical Inspectors, for his tour of the West. The first was a **Montana Chapter** meeting at Havre, Mont., April 18-19. As previously announced the **Idaho Chapter** meeting at Pocatello was on April 22 and **Eastern Washington Chapter** meeting in Spokane April 24; a combined **Puget Sound** and **Oregon Chapter** meeting at Longview, Wash., was April 26. A joint meeting of **Northern California, Central California** and **Sacramento Valley Chapters** was to be at Oakland May 3; **Arizona Chapter** meeting May 10 at Scottsdale, Ariz.; **Southern California Chapter** meeting at Long Beach May 14; **Nevada Chapter** meeting, Las Vegas, May 16; and **Utah Chapter** meeting, Salt Lake City, May 19. The **Rocky Mountain Chapter** meeting, not previously announced, was set for May 22 at Denver. Reports on some of these meetings will appear in subsequent issues.

Southern California Chapter heard Sam Rosch, consulting cable engineer of Anaconda Wire & Cable Co., at its last meeting, March 26, at Huntington Hotel in Pasadena. Chairman L. E. LaFehr presided. H. G. Ufer, Southwestern Section secretary, announced the dates of the annual meeting as Sept. 18, 19 and 20, at the California Hotel, Fresno, and urged early reservation of rooms.

Last meeting of Northern California Chapter had a demonstration of the Cadweld system of making connections to large conductors. K. M. Ryals, the manufacturer's representative, introduced Reed Annear of Erico Products Co., who made the demonstration.

Electrical Inspectors' Assn. of B. C. was guest of the Canadian General Electric Co. at the April 16 meeting, V. Rolfe presiding. Lamps and lighting was the subject of Gordon Wheatley. The study group report on range diversity factors by W. Leppard, chairman, and on nonmetallic sheath cable by L. Handy were on the agenda.

Vancouver Electrical Assn., the electrical contracting organization in Vancouver, recently elected R. Beaumont as its president, P. Grumsel, vice-president, S. Murkin, secretary and R. Sutherland, treasurer. The organization comprises 145 electrical contractors in greater Vancouver area. C. Yule, Crescent, B. C., was recently elected president of the Lower Fraser Valley Electrical Contractors' Assn.

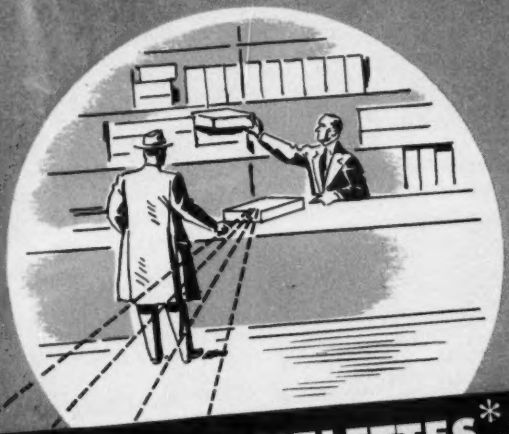
Montana Chapter of National Electrical Contractors Assn. is again going to submit an electrical licensing law to the legislature of Montana. It cannot very well be prepared until the January 1953 session but work has already started on it. The chapter is also working to keep the legislature from passing a bill that general contracts only be let on state work. The chapter naturally wants separate bids for electrical work. Chapter Manager William Blackmar has likewise been working in Idaho toward a state chapter in that area and since he has been appointed recently as a field representative for NECA may make his field office in that state. He has also been working to organize divisions in Glendive and Missoula.

Roscoe E. Watts, executive secretary of the Pacific Electrical Contractors Assn., Portland, returned from a tour of duty in the U. S. Army and has resumed the secretaryship of the association. Arthur M. McLean is president and D. S. Calderwood vice-president.

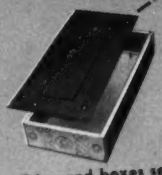
Electrical Maintenance Engineers Assn. of northern California had a demonstration of the Cadweld process by K. M. Ryals, manufacturer's representative and northern California distributor, at its April 17 meeting in San Francisco.

Inspectors saw heavy conductors being welded by Reed Annear, Western representative of Cadweld process, at the Northern California Chapter IAEI meeting in San Mateo. In the background are Ken Bliss, secretary, and Mervyn Bader, chapter chairman

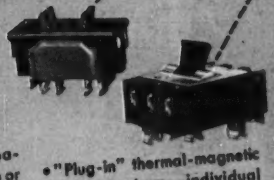
Off-the-Shelf DELIVERY!



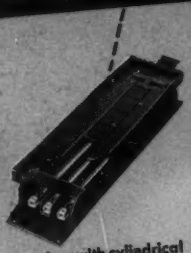
SQUARE D "PLUG-IN" PANELETTES* FOR *LIGHTING AND POWER* SYSTEMS



• Trims and boxes separately packaged. Flush or surface type. Flush lock—directory frame—ample knockouts.



• "Plug-in" thermal-magnetic circuit breakers—individual cartons. 15 to 100 ampere ratings available.



• Interiors with cylindrical bus bars and neutral plate.

TIME SAVERS—varying job requirements can be met by using different combinations of standardized components—immediately available from Electrical Distributor stock.

MONEY SAVERS—moderate initial cost. "Plug-in" design reduces installation cost substantially.

LESS MAINTENANCE—sturdy, simplified design and construction. Positive-pressure contact jaws. Fewer bolted connections.

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Meeting the Nation's Growing Power Load

Greater System Capacity through new and higher Breaker Ratings

Heavy-power concentrations and extensive system interconnections have created demands for circuit breakers with unprecedented characteristics and ratings. Yesterday 10,000,000 kva for 230,000 volts looked like the ultimate . . . today we are approaching 15,000,000 kva. Westinghouse has developed and already has installed other new and higher ratings for a wide range of voltages.

What's the meaning of these new ratings? Higher voltages will carry larger power blocks more economically. Higher interrupting capacity makes greater concentration of generation or of transmission lines at one location possible. With the same system stability, extra transmission lines and current-limiting reactors are eliminated.

Westinghouse started getting ready for these new interrupting peaks 27 years ago, when the High-Power Laboratory was created. The facts gained from thousands of short-circuit tests . . . proving ratings as high as 10,000,000 kva . . . have enabled us to reduce breaker operating time, size, and amount of equipment to do the job.

It's another example of Westinghouse thinking ahead. It's an awareness of all utility needs . . . keeping breaker capacity, for example, in step with system expansion, so that your investment in generating and transmission facilities can be protected. With the realization that America's power appetite is growing, marches our responsibility to build apparatus . . . that is more efficient, economical and reliable. J-97162

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Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

New ratings available

Since 1945 Westinghouse has developed the following new circuit breakers:

34.5 kv, 2,500,000 kva
69 kv, 3,500,000 kva
115 kv, 3,500,000 and 5,000,000 kva
138 kv, 5,000,000 and 10,000,000 kva
161 kv, 5,000,000 and 10,000,000 kva
230/196 kv, 10,000,000 kva

Westinghouse is the first company to build and have installed 161-kv, 10,000,000-kva breakers. 230-kv, 10,000,000-kva breakers already have several years of field experience. Westinghouse also will soon deliver a substantial number of 138-kv, 10,000,000-kva breakers.

Westinghouse also has converted existing breakers to ratings of 10,000,000 kva by changing to new interrupters . . . extending the useful life of present equipment.

New pneumatic mechanisms

Modern power requirements call for high-voltage circuit breakers capable of initial reclosure in 20 cycles or less. The newly developed Westinghouse pneumatic-operating mechanism combines high-speed reclosing with mechanically trip-free opening so that the breaker cannot be held closed after a tripping impulse has been given. Further, latches are reset so rapidly that subsequent reclosures are possible after intervals only a little longer than the initial reclosure.

New surge-tank development

High-current arcs manifest themselves as shock waves inside the tank. To reduce the impact on the bottom of the tank and the foundations, and to eliminate rebound, surge tanks are mounted in the breaker to absorb the shock. Here again, Westinghouse engineering development and testing make higher ratings possible.

Chronology of breaker developments

In 1930, the original "De-ion®" grid reduced breaker opening time from 30 cycles down to a new standard of 8 cycles. The Multi-flow grid in 1940 made higher ratings possible and reduced standard opening time to 5 cycles. The extension of the Multi-flow grid principle has resulted in smaller sizes, lower oil content and higher interrupting ratings, and faster opening times down to 3 cycles.

To learn how these new developments can help you, call your Westinghouse Electric Utility representative . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

THE MONTH IN BRIEF

Overhead Line Protested by Property Owners

Despite the fact that it is a municipal utility, the Department of Water & Power in Los Angeles is running into a storm of opposition to its proposed transmission line from the San Fernando Valley, where it is building a new receiving station, to tie in with its substations in the western part of the city. The proposed route would cross two suburban residential areas. To go underground would cost some $29 million as against $11 million for the overhead line, it is estimated. Taking note of the controversy, the California Legislature's assembly committee on public utilities and corporations recommended that consideration be given to legislation requiring all such lines through populated areas to be placed underground. Creation of a special assessment district in West Fernando Valley in which residents would underwrite underground power lines was offered last month at a meeting between department officials and property owners. Mayor Fletcher Bowron presided at the 3½-hour meeting, which followed company condemnation notices along the proposed 21-mile route.

Funds Authorized for Feather River Plans

Funds to prepare plans for California's Feather River development were included in the state's fiscal budget passed by the legislature and signed by Governor Warren. Issuance of revenue bonds for state construction of the project was authorized in 1951. Story page 120.

Two New Power Houses For Pit Plant

Extension of its Pit River hydro development by construction of two new power houses at a cost of $45 million is planned by Pacific Gas and Electric Co. The two plants, Pit 4 and Pit 6, will add 144,000 kw of new generating capacity to the PG and E system. Story page 120.

New Attempt Made to Stop Pelton Construction

Petition to review and set aside the FPC license for Portland General Electric's Pelton Dam was filed with the U. S. Circuit Court of Appeals in San Francisco by representatives of the Oregon Fishing and Game Commissions. Petitioners argue that the commission lacks jurisdiction to authorize a license for a hydroelectric project on a nonnavigable stream in the State of Oregon, and hold that the commission has no jurisdiction to authorize a private utility to use, divert and impound waters in the river. PGE earlier offered to make provisions for artificial rearing of fish in hatcheries, but the Oregon Fish Commission rejected the plan.

New Electrical Code for Seattle

The Public Safety Committee of the Seattle City Council has recommended adoption of a new city electrical code proposed by a large group of electrical leaders and municipal technical officials. The Electric Club of Washington took leadership in organizing and directing industry and labor union work on drafting the code, which required about two years work for some 100 men. The proposed code would replace one that has been in operation for 20 years and would permit use of many new materials and methods that would mean savings to the home builder, according to John Watt, head electrical plan examiner for the city.

State Earmarks Fund for CVP Down Payment

California's state legislature has earmarked $10 million as a down payment in case the state decides to buy the Central Valley project from the federal government. Earlier, State Engineer A. D. Edmonston submitted a report to the Water Project of California that state ownership is financially feasible. This agency, Edmonston reported, has authority to issue revenue bonds for CVP purchase without additional state legislation. Congress would have to approve the transaction, however. The 287-page Edmonston report outlines several plans for issuing bonds to purchase the project. Each proposes issuance of bonds to be paid off over a period of 50 years. The plans assume the federal government will not require reimbursement for flood control, navigation and salinity control benefits.

Alberta Gas Coming to Northwest

Alberta natural gas is expected to start flowing through a $100 million pipe line to Pacific Coast markets in B. C., Washington and Oregon within two years. Alberta's legislature last month approved the permit introduced by Premier E. E. Manning authorizing Westcoast Transmission Co. Ltd. to export natural gas from the Peace River area as recommended by the Alberta Conservation Board. Still required but considered positive were approval by the Board of Transport Commissioners of Ottawa on the interprovincial route; the Dominion cabinet on export to the U. S.; the FPC for sale in the U. S. The Conservation Board's recommendation limited export to about 300 billion cubic feet of gas over 22 years.

Wash for Bomb-Deposited Radioactivity

A wash designed to rid surfaces of bomb-deposited radioactivity has been developed in a Portland laboratory. Jack De Ment, under contract to the Atomic Energy Commission, completed experiments on the formula in 1947 but kept it secret until his patent, now assigned to AEC, had been granted. The commission has made the formula available on a royalty-free basis. Intended for use on metal, wood or other hard surfaces, the solution of water and silicon tetrachloride attaches itself to radioactive atoms, forming a gelatinous solid that can be washed off. The formula isn't claimed to be a cure-all. One problem yet unsolved is disposal of the wash after it is filled with radioactivity.

Here's ONE OIL that's right for ALL of your oil-filled electrical equipment

It's the right oil for your transformers and voltage regulators because its resistance to oxidation is so great that it will outlast conventional oil many times over. On its record to date, the service life of Shell Diala Oil AX is estimated at up to 50 years!

It's the right oil for your switches and circuit breakers because it has unexcelled carbon-settling properties. Your assurance of that lies in a special control which Shell has installed in the manufacture of Shell Diala Oil AX.

SHELL

Cut down your inventory...cut down your maintenance costs...switch to this one oil that's right for all of your oil-filled electrical equipment
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What do you mean, it CAN

Well

SAFETY
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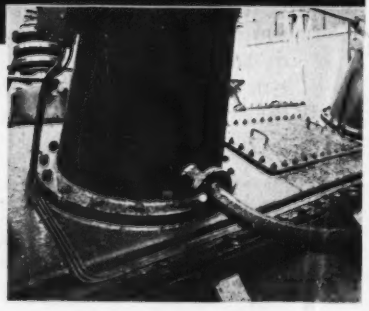
WIRING
PYROTENAX ®
A GENERAL CABLE PRODUCT



Safety m.i. Wiring* in exposed installation on outdoor transformer bank.

*Exclusively a General Cable Product.

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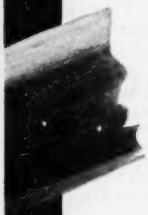

can be hammered, crushed, bent, twisted, jerked —with no impairment of its electrical performance.

Emergency overloads can't hurt it. Age causes no deterioration. It will outlast the structure in which it is installed!

and... ONE STEP INSTALLATION!

No additional mechanical protection required. Safety m.i. Wiring is its own conduit. Available fittings permit installation in one operation, using standard switch and standard junction boxes. Smaller diameter provides reserve space and assures neat appearance...

and... NO VAPOR PASSAGE!

Completely filled with compacted mineral insulation. Necessity for specially installed seals in the cable-run to prevent the passage of combustible gases through a wiring system is wholly unnecessary with Safety m.i. Wiring...

and... COMPLETELY MOISTURE PROOF!

Simple fittings permanently seal both ends of each run of wiring. No possible entrance for moisture. Normal concern over this hazard is thereby completely eliminated...

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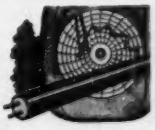
Thumb-pressure bending, in ordinary sizes, easily fashions orderly wall patterns—conforms wiring to any contour. Once formed, and fastened with standard clamps or straps, it stays put...



and... NO HEAT DETERIORATION!

The mineral insulation is physically stable up to 2800° C., thereby assuring against deterioration by heat, even beyond the melting point (1083° C.) of the copper sheath.

Your General Cable representative is well qualified to discuss the important advantages New Safety m.i. Wiring offers to all industry—for all applications from 0-600 volts. Contact the nearest General Cable office.

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THIS MONTH'S NEWS

Pit River Extension Plans Announced

Pacific Gas and Electric Co. has announced plans to extend its Pit River hydroelectric development in Shasta County, Calif., by construction of two new power houses, Pit 4 and Pit 6, at a total estimated cost of $45 million. The project will add 144,000 kw of new generating capacity.

N. R. Sutherland, vice-president and general manager, said the company has applied to the Federal Power Commission for an amendment to an existing license for Pit 4 to permit changes from the original plans and for a license to construct and operate Pit 6.

Pit 4 power house will have a generating capacity of 84,000 kw and will cost an estimated $25 million. The company desires to begin construction by July 1 and estimates that the project can be completed by 1955. Pit 6 will have a capacity of 60,000 kw and will cost approximately $20 million. It can be completed in an estimated three years from the start of construction.

The two new plants together will increase the total power capacity in the company's Pit River system to 440,000 kw.

PG and E now has three power houses on the river, Pit 1, Pit 3 and Pit 5, plus Hat Creek 1 and Hat Creek 2 on a tributary. The dam and reservoir for the Pit 4 project were completed in 1927 in connection with earlier development of the river.

In the resumption of the project a 19-ft-diameter tunnel will be driven four miles to carry water to the Pit 4 plant, which will be situated approximately one mile upstream from the Pit 5 diversion dam. Pit 4 power house will have two turbine-generator units. A 220,000-v transmission line will extend about seven miles from the plant to a junction with the PG and E interconnected system.

Pit 6 power house will be located immediately below a dam to be built approximately seven miles downstream from Pit 5 power house. The dam will be of concrete gravity-type construction with a maximum height of 230 ft above stream bed and a crest length of about 700 ft. It will create a reservoir extending upstream as far as the tailrace of Pit 5 power house.

Twin penstock pipes 15 ft in diameter and extending about 160 ft through the dam will carry the water to the plant's two turbine-generators. A 220,000-v transmission line three miles long will connect the plant with the company's interconnected system.

REA Makes Loan to Indian Community

The Metlakatla Indian Community on Annette Island near Ketchikan, Alaska, has received a $1,303,000 REA loan for construction of a hydroelectric project on Purple Lake in the mountainous center of the island, according to an announcement at Seattle by the Hubbell & Waller Engineering Corp., consulting engineers on the project.

The project is expected to develop about 3,000 kw to supplement a 450-kw hydroelectric plant on nearby Chester Lake and a 270-kw diesel electric plant now serving the community. The town has about 1,000 residents, with a community-owned salmon cannery, sawmill, other industry and an air base operated by the Civil Aeronautics Administration.

Plans call for a small dam on Purple Lake, a water tunnel one-half mile long, penstock, power house, 10 miles of transmission line and a distribution system in Metlakatla. Bids for construction and equipment are expected to be called this summer.

● **FPC** has issued a preliminary permit to Washington Water Power Co. for a proposed hydro development on the Clark River in Sanders County, Mont. The development would include a concrete dam at the Noxon Rapids site creating a 17-mile reservoir; a power house with 187,000 hp installed and provision for additional capacity; a 230-kv transmission line connecting the plant with the company system.

● **A $10 million plant** will be built by Hawaiian Electric Co. in downtown Honolulu on a site adjoining its present 100,000-kw plant. First 50,000-kw unit is scheduled for operation in mid-1955.

Funds Granted to Study Feather River Project

An $800,000 appropriation for preparation of plans for the Feather River water and power project is included in California's 1952-53 fiscal year budget passed by the legislature and signed by Governor Earl Warren.

Issuance of revenue bonds for state construction of the project was authorized at the 1951 session of the legislature. The 710-ft-high main dam, five miles upstream from Oroville, would create a 3,500,000-acre-ft reservoir. An afterbay reservoir would have 8,200 acre-ft capacity. The power house would be a reinforced concrete substructure and superstructure housing five 88,000-kw generators. A power house at the Oroville afterbay dam would have two 12,500-kw units.

Preliminary plans call for transporting stored water south to the Mexican border. The legislature has specifically provided, however, that none of the water should be construed as a substitute for California's share from the Colorado River.

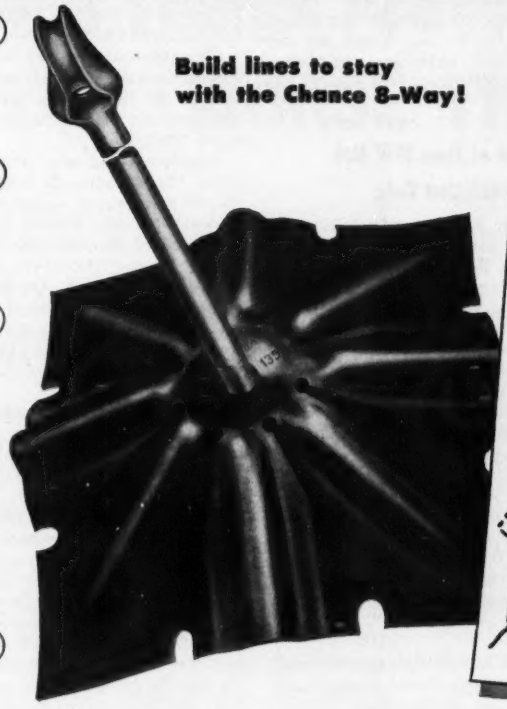
The Water Project Authority of California has applied to the Federal Power Commission for a license for the development.

Long Line Built to Span Kootenay Lake in B. C.

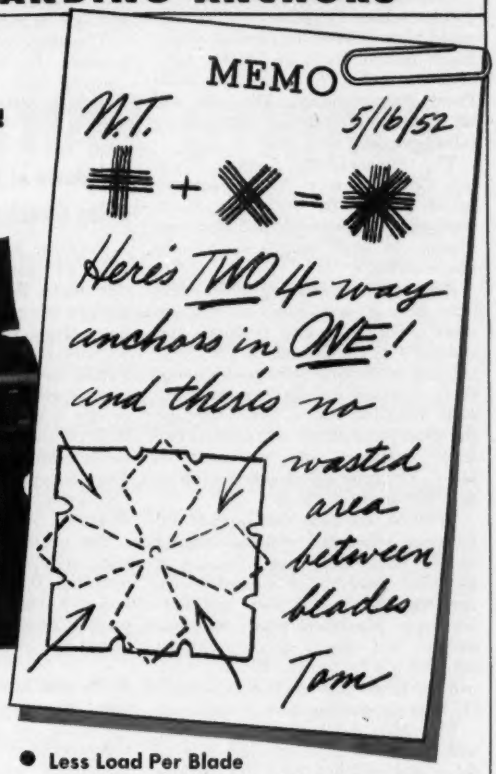
Construction of three two-mile cables across Kootenay Lake in British Columbia has been completed. The span is part of a $3 million, 87-mile 170,000-v line running from Consolidated Mining & Smelting Co. of Canada's West Kootenay Power & Light Co. plants eastward to carry power to the company's mine and concentrator there and for a new $9 million fertilizer plant.

Dominion Bridge Co. strung the 10,656-ft lines across the lake and built the steel towers supporting them. Cables are 1.25 in. in diameter, weigh 17.25 tons each, have no welds or joints. The line is suspended on the west from a 366-ft steel tower, based 100 ft above the lake, and on the east from small towers 120 ft above the lake. Suspension work took three weeks.

CHANCE 8-WAY EXPANDING ANCHORS



Build lines to stay with the Chance 8-Way!



● No Wasted Space Between Blades

In designing the 8-Way, steel, expanding anchor, A. B. Chance Company engineers took full advantage of all the available area. There is no wasted space between blades. The load is distributed all the way around the anchor.

● Expands in Cone Shape

Controlled by the bell shaped base, the eight blade, one piece top plate expands to form a cone shaped square, which distributes the anchor's holding power over a wide area, building up compression against an inverted pyramid of earth. The 8-Way retains its shape under extremely heavy loads because the base plate supports the blades in the middle and distributes the load uniformly over the blades. Reinforcing ribs provide additional strength.

● Less Load Per Blade

Each of the 8-Way blades is required to carry approximately one-eighth of the total load, whereas each blade of the conventional four or two-way expanding anchor has to support from two to four times this amount. This is particularly advantageous where heavy obstructions block expansion of one or two blades. The other blades can expand to carry the load.

● More Holding Power for Less

The Chance 8-Way Expanding Anchor saves you money. The simplified design cuts manufacturing costs—a saving passed along to 8-Way customers. Compare costs per square inch area—you get more holding power for less with the Chance 8-Way Expanding Anchor.

Cat. No.	Hole Size	Area Sq. In.	Nominal Class	Rod Size (Order Separately)	Approx. Weight Per 100	No. in Bundle	Ultimate Soil-Anchor Holding Strength—Pounds 7′ Depth. No Safety Factors Included.				
							*Class 3	*Class 4	*Class 5	*Class 6	*Class 7
6870	6″	70	2200, 4000 6000	½″x6′ ⅝″x7′ ⅝″ x 8′	467	5	16000	14000	11000	8500	5000
88100	8″	100	6000	⅝″ x 7′	811	3	22000	18500	15000	13000	8000
88115	8″	115	8000		880	3	24500	20500	17000	14000	9000
88135	8″	135	10000, 12000	¾″ x 8′	1056	3	26500	22000	18500	15000	10000
88135–1	8″	135	10000, 12000	1″ x 10′	1056	3	26500	22000	18500	15000	10000
1082	10″	200	20000		1900	2	31000	26500	21000	16500	12000

* These numbers indicate types of soil: 3. Hard, dry—hardpan. 4. Crumbly, damp—usually clay predominates. 5. Firm, moist—usually clay predominates. Includes most well drained areas. 6. Plastic, wet—usually clay predominates. Includes areas only seasonally wet with slow drain as in fairly flat terrain. 7. Loose, dry—arid regions with sand or gravel predominating. Also loose wet—high in sand, gravel or loam content—absorbs excessive moisture in rainy seasons as in poorly drained areas.

C52-12

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A·B·CHANCE CO·

230-KV SUBMARINE CABLE MODELS TO BE BUILT

Contracts for scale models of a 230-kv submarine power cable, proposed for 1954 construction under Puget Sound north of Seattle, have been awarded by the Bonneville Power Administration. The cable will be the world's largest high-voltage submarine line.

The Phelps-Dodge Copper Products Corp. has received contracts totaling $18,991 for 900 ft of 10-in. steel pipe and copper cable for tests leading to final installation of the power cable.

Plans call for welding 10-in. steel pipe into a continuous length on shore, floating it into position, and sinking it to the bottom of the channel. When the pipe is in position and shore terminal installations are complete, the cable will be pulled through the pipe on a series of conveyorlike cable carriages and anchored in place. The pipe will be filled with oil at a pressure of 200 lb.

Tests on the pipe will include engineering rehearsals of all procedures for the final installation, cleaning of the pipe, assembly of welded joints, stripping the power cable, and friction tests. Maximum power load capacities and effects of short-circuiting also will be tested. All these tests will be conducted at Bonneville's J. D. Ross substation near Vancouver.

The cable, 4.5 miles long, together with overhead lines on each side of the sound, will link BPA installations at Snohomish substation with a proposed 230-kv substation at Kitsap, near Bremerton. The project, with substation, is expected to cost $6 million.

Preliminary soundings and profile mapping of the channel are being made by the U. S. Coast & Geodetic Survey while samples of the channel bottom and other data are being obtained by the University of Washington oceanic laboratory.

The submarine line will eliminate the necessity of some 100 miles of overhead construction.

Umpqua River Plant Now Operating in Oregon

Power has started flowing from California Oregon Power Co.'s new Soda Creek plant on the North Umpqua River in southwestern Oregon.

The new unit is the third of eight plants the company will build on the upper North Umpqua. Cost of the entire project, including transmission lines, will approximate $28.3 million.

Previously energized plants are at Toketee Falls and Slide Creek. Still to be completed are two units at Clearwater Creek, two at Lemolo Falls, and one at Fish Creek.

The three plants now in operation produce 71,750 kw. When the remaining five units are completed, capacity will amount to some 145,000 kw.

Shutdown at Dam Will Not Delay Completion Date

Concrete pouring at Lookout Point Dam, $75 million unit of the Willamette basin flood control and power project in western Oregon, was closed down through inability of contractors to complete relocation of Southern Pacific railroad tracks by the scheduled April 1 date. Slides and delays in the delivery of materials have so delayed work that the relocation job cannot be finished before June or July, according to Col. Thomas H. Lipscomb, Portland District Army Engineer.

The shutdown, Colonel Lipscomb said, will not delay the scheduled operation date, July 1954. He added, however, that but for this delay the project might have been completed ahead of schedule.

● **As soon as materials become available,** the Coos-Curry Cooperative, operating in southwestern Oregon, will start work on the first phase of its $1,350,000 expansion program, financed by the Rural Electrification Commission. About $350,000 of the money will be spent this year for constructing new and rebuilding old transmission lines.

● **California and Hawaiian Sugar** Refining Corp.'s Crocket, Calif., plant will purchase stand-by service from Pacific Gas and Electric Co. The plant has generated its own electrical power since 1919 but increase in electrical equipment requires the output of its four generators, leaving no reserve.

● **Although underbid** several hundred thousand dollars by an English firm, Moloney Electric Co. of St. Louis has been awarded a $1,432,461 contract by the Corps of Engineers for furnishing nine 56,500-kva transformers for McNary Dam on the Columbia River near Umatilla, Ore. The low bid of the Ferranti Electric Co., Lancashire, England, did not meet specifications, according to Col. W. H. Mills, Walla Walla district engineer for the corps.

LAND WITHDRAWAL PROTESTED BY CALIFORNIA OFFICIALS

Strong protests were lodged against USBR action in withdrawing from public entry some 175,000 acres of land in eight California watersheds.

Objections were raised by the California legislature, which was in session at the time of the bureau's action, and the Water Project Authority of California.

Legislators and other state officials argue the withdrawal would hinder the development of water and power projects by any public or private agency other than the federal government.

State Engineer A. D. Edmonston charged the withdrawal, if approved by the Secretary of the Interior, would block the state's plan for the $1 billion development of the Feather River project.

The land withdrawals affected the Feather, American, Trinity, San Joaquin, Kern and Kings Rivers and Putah and Mill-Deer Creeks watersheds.

The action was construed as posing a threat to private power development in those areas.

Richard L. Boke, Sacramento regional director of the bureau, said it was unfortunate the move "should be interpreted as a gesture of federal hostility toward state development." He said the bureau has no such intention. Resolutions adopted by the legislature would have the State Water Resources Board protest the bureau's filings and ask Congress to take steps for the immediate restoration of the lands to public entry.

Legislators said it was significant that the very day the state water project authority filed with the FPC for a license for the Feather River project, the bureau filed its first form withdrawals.

They pointed out there is currently litigation in the Ninth Federal Circuit Court of Appeals between the bureau and FPC over the commission's right to issue licenses in a withdrawn area.

In the litigation the bureau is seeking to nullify licenses granted to the Pacific Gas and Electric Co. for development on the Kings River on the premise the bureau had withdrawn the land for similar development by the government.

● **Bonneville Dam** established a new record for its power production during March, when its power house turned out 418,843,000 kwh. The previous record for a single month was 407,544,000 kwh in January 1952.

Some Things Are WORSE THAN STRIKES

This editorial which appears in McGraw-Hill publications was written just prior to the resignation of Charles E. Wilson as Director of Mobilization. The principle it discusses is of basic and continuing importance in our struggle to maintain economic and personal freedom in America.

It is to be hoped that the managements of the steel industry will resolutely resist the efforts of the national Wage Stabilization Board to force them to establish the union shop in their plants. In essence, the union shop means compulsory union membership.

They should resist not because of any financial advantage to the owners of the industry. There would be none. They should resist out of a decent regard for those ideals of our country which we are now fighting in Korea to protect. Moreover, their resistance would, as a matter of fact, benefit the leaders of the organized steel workers by protecting them from the certain and bitter fruits of their "victory" in getting the government to impose the union shop on the steel industry. Their successful resistance would also prevent Premier Stalin and his co-workers from enjoying a hearty laugh at our expense.

Fun for the Russians

This is why the Politburo would find the establishment of the union shop in the steel industry, at the behest of the Wage Stabilization Board, so profoundly amusing. We are fighting in Korea because we believe that armed aggression, promoted by Russia, menaces our freedom. And we are spending hundreds of billions of dollars here at home for armament to protect our freedom at other danger points. When this rearmament program is threatened by a crippling strike, the federal government through its Wage Stabilization Board proposes to buy off the threat by plowing under a vital element of that freedom which we are trying so desperately to preserve.

When the union shop is adopted through voluntary agreement, as it has been in cases covering millions of workers, it deeply undercuts the freedom of the individual. To hold his job he is required to join the union and support it financially whether he wants to or not. In the case of such voluntary agreement, however, the government takes no direct part in thus destroying the freedom of its citizens. It is essentially a private transaction.

Tyranny is the Word

But in the steel case the federal government becomes a party to a direct attempt to impose the union shop. Instead of protecting its citizens in their right to earn a livelihood, the government forces certain of them to join and support a private organization which they have clearly indicated they do not want to join. This they must do to hold their jobs. Tyranny is the accepted designation of government coercion of this kind.

It may be objected that the Wage Stabilization Board merely recommends the union shop, does not order it. This was also true of the action recently taken by a President's Emergency Board, which also "recommended" that working agreements between the

railroads and about a million non-operating railroad employees include a provision for the union shop. A government recommendation, however, can easily be given much of the force of an order, particularly by the calling of a strike to "uphold the hand of the government."

It seems entirely clear that in trying to impose the union shop on the steel industry the Wage Stabilization Board has completely lost its bearings. It was set up to handle labor problems to tide over an emergency. Now it comes up with a revolutionary modification of labor relations in the steel industry which, if adopted, would become a permanent part of the institutional machinery of the industry.

"Too Much Like Hitler"

Early in World War II an effort was made to have the federal government order the union shop for a group of organized coal miners. President Franklin D. Roosevelt, who will go down in history as one of organized labor's greatest champions, blocked it. "That," he said, "would be too much like the Hitler methods toward labor." But now, with supreme irony, the federal government fosters this Hitlerlike method toward labor ostensibly to advance our conflict with Stalin.

In persuading the Wage Stabilization Board to sponsor the union shop for steel workers, there is every reason to believe that the union leaders have trapped themselves. If the government imposes the union shop, a next step clearly becomes necessary. This is government regulation of the union in order to provide a modicum of protection for the minority that would be forced by the government to join against their will. It could be that for a time the government would ignore this obligation. But, having granted the union the power to eliminate the minority, it would sooner or later be forced to regulate the use of that power. Thus free collective bargaining and freedom itself would be the losers.

An Issue of Basic Principle

Resistance to a government-sponsored union shop for the steel industry is bound to bring harsh denunciation both from the administration and union leaders who have teamed to back it. Not only does the union shop relieve the union leaders of the problem of recruiting members, it also eliminates a group of workers that they stigmatize as "free riders"—namely, those who work for companies which have a working agreement with a union but do not join the union. In the basic steel industry about 10 per cent of those who work for companies with union agreements are not members of the union. Such a small percentage of non-members is obviously no threat to the "security" of the union, although that is what the drive for the union shop ostensibly is designed to protect.

In the reporting of the present labor dispute in the steel industry virtually all of the attention has been focussed on the handling of the issue of a wage increase and how large it should be. This, to be sure, is vitally important. Mobilization Director Wilson has said it is "a serious threat to our year-old effort to stabilize the economy." But certainly of comparable importance is the tremendous issue of principle raised by the government's backing of the union shop for the steel industry.

If the position of the Wage Stabilization Board on the union shop prevails, our government will have blunted the arms we are forging to fight for our freedom abroad by undermining a major bulwark of our freedom right here at home. At this critical time in the struggle to preserve and protect our freedom such a subversive course should be resisted to the limit.

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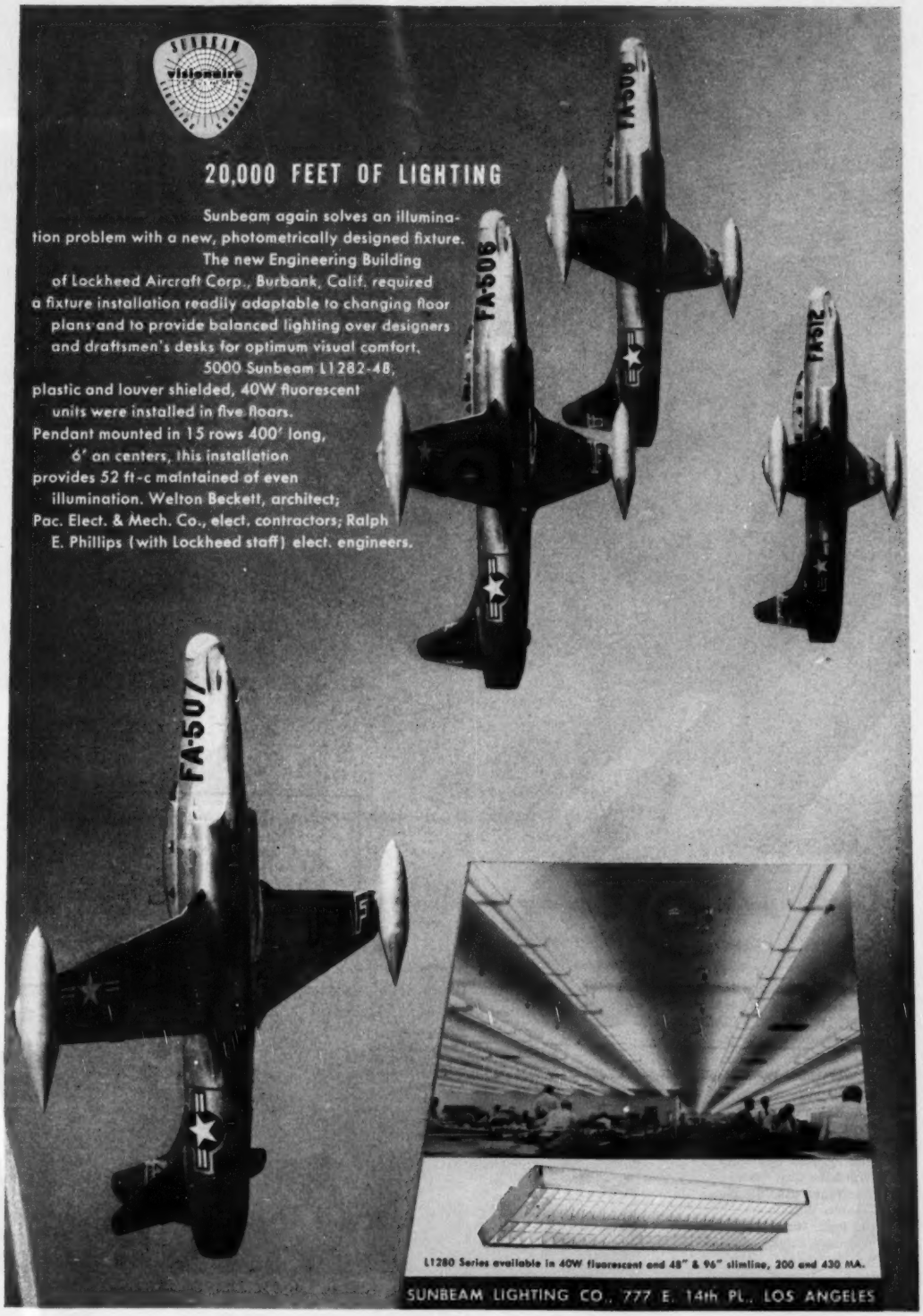
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NLRB EXAMINER FINDS FOR COMPANY AT LOS ANGELES

An NLRB trial examiner has ruled that companies have the right to introduce into contract negotiations measures to protect themselves against Communist infiltration and Communist-inspired "political strikes."

The examiner, David F. Doyle, made the finding in granting a motion to dismiss an NLRB complaint against the Square D Co. plant in Los Angeles. The complaint was issued on charges brought by the independent United Electrical, Radio and Machine Workers.

The UE had charged the manufacturer with refusal to bargain in good faith with the union. Doyle found that the company had not refused to bargain—that negotiations had reached an impasse through no special fault of the company. He found, also, that the UE did not actually represent a majority of the company's employees.

Many issues were involved, but the only unusual ones involving significant implications were the political ones. The union charged that these subjects raised in the company were not proper matter for contract negotiations:

Requirements for non-Communist affidavits from all local and international officers or representatives dealing with the company. (The company offered to make this a requirement of company officials, too.)

The right of the company to discharge any employee who disseminated communistic literature in the plant, or who verbally advocated Communist action or the overthrow of the United States government by force or violence.

The union argued that inclusion of these points in the contract would abridge the political freedom of the employees. Doyle noted that the UE had been expelled from the CIO for alleged Communist domination. He said that "the representatives of the company had reasonable ground to believe that they were dealing with a Communist-dominated union and that some of the representatives of the union were then actively engaged in promoting the cause of Communism.

His reasoning in making the decision was this:

The company "could not refuse to bargain with the union because of its alleged Communist domination, but it could propose in the field of collective bargain such security measures as it deemed proper. I find, therefore, that under the circumstances of this case the Respondent had a right to seek in collective bargaining that the UE give it security assurance and guarantees, which might be evidence of bad faith if asked of a union who possessed a reputation of unquestioned patriotism."

As for writing into the contract the right to discharge employees disseminating Communistic literature or advocating the overthrow of the government by force, Doyle said that the company had that right anyway. He reasoned that the company was within bounds in trying to have the right spelled out in the contract, as an attempt to guard itself against a political strike.

Doyle recommended to the NLRB that it affirm his action in dismissing the complaint. Approval is automatic and board action is not required unless the decision is contested. The decision will not be a precedent for future rulings unless the board does take action.

It is expected that the UE will oppose the finding before the board.

Square D Co.'s home office is in Detroit. Each of the company's branches has a separate union contract negotiated locally.

PG and E Employees Vote For IBEW Representation

Some 12,000 employees of Pacific Gas and Electric Co. reaffirmed the right of the AFL International Brotherhood of Electrical Workers to bargain for them in a National Labor Relations Board election late in March.

Results of the NLRB balloting showed 5,072 votes for AFL, 3,158 for CIO, and 156 favoring neither union.

CIO Utility Workers Union, which had represented most of the PG and E employees prior to a similar vote in 1950, questioned the jurisdiction of the AFL union and petitioned the NLRB for an election. Under NLRB rulings, such union petitions may come up every 12 months, but no oftener.

Ballots for a separate run-off election for 3,000 PG and E clerical workers were mailed April 10, since results of an earlier election were inconclusive. In the event of an AFL-CIO tie in the runoff, the clerical workers would be represented by neither union.

● **Seattle City Council** has been asked to approve a $3,180,000 City Light program for installation of new substations and the expansion of others. A major part of the program calls for 16 unit substations, costing $1,830,000.

SEATTLE CITY LIGHT RATE REDUCTION RECOMMENDED

A reduction of Seattle City Light rates that will save customers approximately $1 million a year, effective by July 1, has been recommended to the city council by Superintendent E. R. Hoffman. The reduction, if made, will be the first since 1941.

Chief beneficiaries would be residential lighting and heating customers, who would get reductions totaling $830,000 a year. Commercial lighting customers would save $170,000 annually.

Saving for more than 100,000 householders on the all-electric rate would be an average of $4.20 annually. For approximately 3,000 who also use electricity for space heating, saving would be increased to $19.60, provided they use in excess of 1,400 kwh during the winter months, October-April.

Previously three city councilmen had asked Hoffman to advise the council "when and to what degree," City Light would be able to reduce rates because of its acquisition of Puget Sound Power & Light Co. properties. The request came after City Light's 1951 financial report showed a sharp jump in earnings as a result of the merger.

GSA Opposes PG and E Increase at Hearing

The U. S. General Service Administration opposed PG and E's proposed 18½% electric rate increase at recent San Francisco hearings. James K. MacIntosh, chief of the GSA public utilities branch, argued that any increase should be based on a return of 5.4% instead of the proposed 5.8%. Hearings were recessed until May 21, when the company will submit survey reports. Further hearings were set for June 18, when PUC will present its analysis; July 2, when city of Stockton and other community protests will be heard; July 23, for the PG and E rebuttal. Decision is not expected before August.

● Sale of the Superior, Mont., Electric Light, Telephone and Water Works Co. to the Montana Power Co. was reported by Fred A. and William A. Horning of Superior, owners of the 60-year-old concern for the past 35 years. The company is reported to be the only one operating three utilities in one community. Sale price was "over $250,000."

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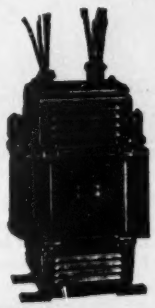

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Kinsey M. Robinson, left, president, and J. E. E. Royer, vice-president and general manager, Washington Water Power Co., study Cabinet Gorge Dam progress display. Below, photograph of the $40 million WWP project as it appeared in early March

● **City of Glendale** is recruiting assistant electrical engineers. Applications for examination were being accepted until May 16. General requirements: age, 21-40; experience, four years in subprofessional electrical engineering work supplemented by college-level courses in electrical engineering, or graduation from a college or university of recognized standing in electrical engineering.

● **Wages** of Arizona Public Service Co. employees were boosted 4.90% following an April 11 agreement between the company and unions representing operating personnel. The increase, based on cost of living allowances, will also go to office workers. One of the agreements calls for the utility to make up the wage differential in Edison and Calapco employees of the same classification within two years.

● **Naknek,** Alaska, PUD was dissolved by federal court ruling after it was declared invalidly created. When the vote to form it was taken, five ballots were thrown out by election officials because they were marked against incorporation of the district but for certain candidates to the board. Had these votes been counted, a tie vote would have prevented formation of the district. The ruling came on a summary judgment by four Bristol Bay salmon packers in an action seeking to prevent PUD directors from levying a tax on their properties.

ENGINEERS LET CONTRACTS FOR CHIEF JOSEPH PROJECT

Contracts for construction of the power house and intake section of Chief Joseph Dam on the Columbia River near Bridgeport, Wash., has been awarded by the Corps of Engineers for $39,749,997 to a combination of contractors, Columbia River Contractors. The combine is composed of the Morrison-Knudsen Co., Peter Kiewit Sons' Co., General Construction Co., Henry J. Kaiser Co., Macco Corp., Walsh Construction Co., B. Perini & Sons, Puget Sound Bridge & Dredging Co. and MacDonald, Young & Nelson.

The contract, which the government had estimated would cost $42,775,610, calls for completion of the power house in 1956, although the first generating units will be installed a year earlier.

● **The Corps of Engineers** has awarded an $8,607,246 contract to Donovan-Foley-Winston-Lytle-James of St. Paul, Minn., for construction of the Albeni Falls power house on the Pend Oreille River in northern Idaho, despite the fact that their low bid was nearly 15% above the government estimate. The Donovan and James construction companies hold the contract for the first-stage spillway section work at the dam, which will cost $31,070,000 and produce 42,600 kw.

● **Pacific County PUD** of South Bend, Wash., has awarded a $71,731 contract for construction of a warehouse at Raymond and authorized Manager Allen Rotta to purchase equipment at a cost of $18,385 for a proposed transmission line from Long Beach to Ocean Park along the Pacific Ocean.

● **Hilo Electric Light** Co. in Hawaii reports a net income of $155,452 last year from which it paid dividends of $90,000. This is a record income for the firm, surpassing its 1949 high by more than $2,000. During the year it successfully moved the generating equipment of its floating power plant, the Fort Dearborn, into its permanent location at the Waiakea steam plant.

● **Foreseeing need** for additional power from Bonneville during the summer months, Tacoma city council has approved an ordinance creating a reserve fund for meeting expected additional payments under the city's contract with BPA. The fund will set aside $25,000 from the city treasury each month.

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NOTES ON THE TRADE

Industry Leader Sees Long Period of Defense Work

A long period of defense production, even if a truce comes in Korea, was predicted by William A. Roberts of Milwaukee, president of Allis-Chalmers Mfg. Co., when he visited the West last month. Roberts spoke before the Los Angeles Electric Club, at the Pacific Coast Management Conference in Berkeley and at a press conference in San Francisco.

The country would not be so fast in dismantling its defense capacity this time as it was at the close of World War II, he believes. The problem, he said, is to arrive at a balance that will furnish the defense program with required equipment and still maintain a healthy civilian living standard. Allis-Chalmers is finding it necessary to operate most of its plants on a dual-purpose basis, with defense expected to total about 30% of volume in 1952, he stated.

Materials shortages, except in copper and some alloys, are easing up, he pointed out. Farm mechanization and electrification continue to make great forward strides.

Allis-Chalmers probably will have 10% greater volume in 1952 and about equal 1951 profits, he believes. Sales in 1951 totaled $457,060,766; profit was $22,416,813.

● **A $500,000 plant** and research laboratory will be built by Sylvania Electric Products Inc. near Mountain View, Calif., as soon as the company is granted a certificate of necessity.

Roberts

First unit of the new plant will be a research laboratory employing some 150 engineers who will work on electronic development. When the plant goes into production, it will turn out electronic devices. This will be Sylvania's first Western plant.

● **Ward Leonard Electric** Co. has moved its Los Angeles branch office and warehouse to new and larger quarters at 1605 E. Olympic Blvd., zone 21. Office facilities have been expanded and more space has been provided for stock and small assembly work. The Los Angeles office is managed by **H. S. Eales.**

● **Washington Industrial Products** of Seattle has acquired the patent rights for Campbell bake ovens. **J. A. Campbell** is no longer associated with the firm, according to **R. N. Coates,** president. The new ownership is the same as that of Coates Electric Mfg. Co. of Seattle, manufacturer of electrical industrial ovens, boilers and allied products. The bake ovens will go under the brand name of Campbell Oven-King. Firm address is 3600 Airport Way, Seattle 4.

New Los Angeles district office and warehouse of John A. Roebling's Sons Co. at 5340 E. Harbor St. Building front is almost entirely of glass and red brick with deeply raked horizontal joints. A canopy extends over the outside entrance and a 30-ft-high sign tower carries the company name. The 44,500-ft of floor space provides office and storage space

Sunnyvale Plant Expansion Outlined by Executive

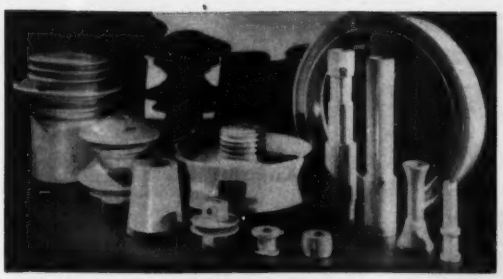
Expansion of the Westinghouse Sunnyvale plant to permit construction of a record-size compressor for a new wind tunnel in Tennessee will now make possible the construction of steam turbines up to 60,000 kw in size, L. E. Osborne, Westinghouse executive vice-president, told a press conference during a visit to San Francisco last month. Three such turbines will be built for 1954 delivery in the East. Two new buildings have been constructed at Sunnyvale and an additional six acres of land purchased for future plant growth.

L. E. Osborne (right) with Walter Maytham, Westinghouse Pacific district manager

Practical power generation from atomic energy can now definitely be predicted, Osborne stated, as the result of experimental work on the power plant for the world's first atomic-powered submarine. Economics is still the major determinant, he reported. From a design and engineering standpoint a successful power plant might reasonably be expected within the next five to ten years, he said, but whether such a plant would be economical is something else again.

Osborne was on a national inspection trip of Westinghouse defense contract operations. He stated that 40% of the present company backlog is defense business.

● **Graham Reynolds Electric Co.** completed and moved into a streamlined new building at Rio Vista and Olympic Streets near Soto, leaving inadequate quarters at 300 E. Third St. in which it had conducted business almost from its inception. The new building is at 1325 Rio Vista Ave., Los Angeles 23, and is near the Santa Ana Parkway on the east side of the Los Angeles River.



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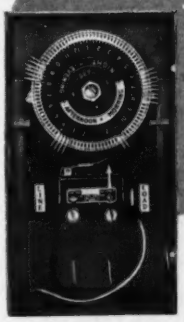

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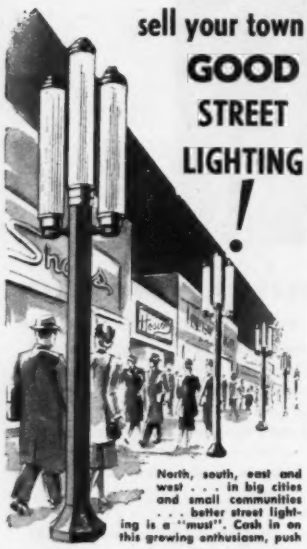
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NEWS ABOUT PEOPLE

● **Marshall Lasher** succeeds the late W. W. Glosser as vice-president and director in charge of the Pacific Coast Division of Hubbard & Co., with headquarters in the manufacturer's Emeryville, Calif., plant. He has been assistant to the vice-president. **Ray Waggoner** has been moved from Chicago to Emeryville to take charge of Pacific Coast sales.

● **Jackson Hoagland,** adequate wiring specialist for Arizona Public Service Co., has been appointed sales promotion and advertising manager, succeeding A. W. "Bert" Smith, who resigned to accept a position with the sales staff of Ebasco Services in New York City. With Calapco since 1949, Hoagland has had many years' experience in sales, advertising and publication work. He was research editor of the *Mining Journal;* editor of *Mining World;* editor of *Pay Dirt,* a Phoenix mining paper; and advertising manager of the Arizona *Times.* Smith's resignation followed 18 years of service with the utility organization. He became sales promotion and advertising manager of Calapco three years ago and continued in the same position with Public Service.

● **G. M. Thomas** has retired as valuation engineer for Pacific Gas and Electric Co. Succeeding him is **Stanley B. Barton.** Thomas was graduated in electrical engineering from the University of Texas and received an MS at the University of California. He started his career with the J. G. White Corp. and later joined PG and E. He was made assistant valuation engineer in 1925 and valuation engineer in 1941. Barton has been with PG and E since his graduation from UC in 1924. He has been assistant valuation engineer since April 1951.

● **Clark Baker Jr.** and **E. J. Duffy** have acquired the interest of **E. S. Bancroft** in the Capital Wholesale Electric Co., 1235 S St., Sacramento. Baker is president, Duffy is secretary of the firm.

● **Robert F. Roberts** has been transferred from Detroit and is now Pacific Coast territorial sales representative for the Westinghouse Electronic Tube Division, with headquarters in Los Angeles.

Robinson

● **Joe Robinson,** Western editor of *Electrical World* and former assistant engineering editor of ELECTRICAL WEST, has accepted the position of sales manager and assistant to the president of Viber Co. of Burbank, Calif., manufacturer of high-frequency mechanical vibrators, used chiefly in concrete construction work. He started with McGraw-Hill in San Francisco in July 1947 as assistant engineering editor of ELECTRICAL WEST and assistant Pacific Coast editor of *Electrical World,* was made Pacific Coast editor of the latter in November 1948 and Western editor in January 1951. He has been active on committees in AIEE, PCEA and the San Francisco Electric Club.

● **Col. F. T. Matthias,** an American engineer, has been appointed assistant to **P. E. Bradley,** project manager in British Columbia for Aluminum Co. of Canada, which is engaged in the first phase of a $550 million hydro-refinery project in northern B. C. During World War II Matthias was a supervisor of construction at the Hanford, Wash., atomic works. Recently he has been in charge of a major project for Brazilian Traction, a Canadian company operating public utilities in Brazil.

● **J. J. Norton** has been appointed assistant to **J. C. McAdam,** heating sales engineer for B. C. Electric at Vancouver, B.C. Norton has been associated with the electrical and gas industry since 1922. In 1932 he joined the B. C. Electric and sold major appliances until the firm ceased its retail sales department in November 1946. Between then and his present appointment Norton has been with the sales department, residential services section.

● **Paul A. Blanchard** has been given the new post of system steam production engineer by Utah Power & Light Co. and will have operational supervision of all steam-electric plants on the system. His former post of mechanical engineer has been taken by **John S. Anderson,** who will deal with steam engineering problems. **J. H. Hutchinson** has been made assistant superintendent at Hale plant.

● **A. C. McMicken** has retired as general sales manager of Portland General Electric Co., after 40 years in the position. He has been with PGE for 49 years, starting in the supply department at the age of 16. McMicken is succeeded by **C. W. Brissenden,** who has been assistant to **George E Sullivan,** vice-president in charge of operations. **Wallace E. Gordan,** assistant rate engineer, will take Brissenden's former post.

● **George A. Gillespie,** former appliance division manager for General Mills, has been made Packard-Bell distributor for the San Jose, Calif., territory. His offices are at 1435 S. First St., San Jose. Packard-Bell also has appointed **Bill Heggenberger,** 1324 W. First St., Santa Ana, Calif., distributor for Orange County, Calif., and **John C. Nash,** 261 S. Park Ave., Pomona, Calif., distributor for that territory.

● **Col. Thomas H. Lipscomb,** Portland district army engineer, has been elected president of the Portland post of the Society of American Military Engineers, succeeding **Kenneth D. Hauser.** Other new officers are: **Robert B. Cochran,** vice-president; **D. M. Pelton,** secretary; **W. O. Silverthorne,** assistant secretary; **Andrew J. Brugger,** treasurer.

● Bonneville Power Administration offices at Spokane have announced the promotion of **Robert P. Walters,** former superintendent of substation maintenance, to area engineer, southwest area, with headquarters at Walla Walla.

● **Joseph H. Rowan** has been appointed director of purchases for Kaiser Engineers division. He has been general purchasing agent for Kaiser Engineers since 1944. He joined the organization 16 years ago during the building of Bonneville Dam.

● **Leonard Walker,** formerly in charge of communications for Idaho Power Co., has been made chief of systems engineer for Motorola.

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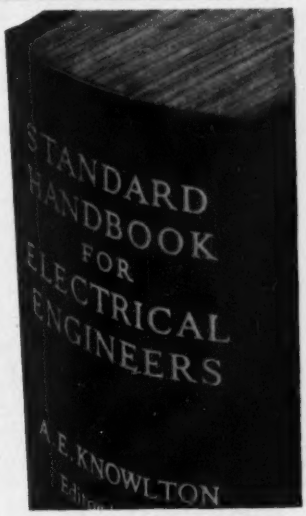

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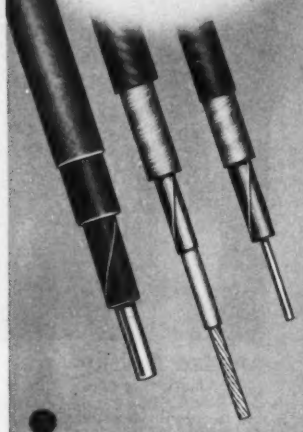

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● Awards of $600 each were given two USBR engineers at Denver, **I. A. Winter** and **John Parmakian,** for solving a vibration problem that was destroying four turbine runners and reducing output at Parker power plant. The awards are the largest the Interior Department can give for efficiency.

● **Edward M. Schindeldecker** has been made Pacific Southwestern district manager for General Mills home appliances, with headquarters in Los Angeles.

Deaths

● **Newton W. Graham,** partner in the Graham-Reynolds Electric Co., pioneer electrical wholesale firm in Los Angeles, passed away April 21. Mr. Graham had been chairman of the Pacific District of the National Electrical Distributors' Assn., a director of the Pacific Coast Electrical Assn., and a director of the old California Electrical Bureau. Born in Sonoma County, Calif., in 1876, he started with Holabird - Reynolds in 1904.

● **C. O. G. Miller,** pioneer California utility executive, died in San Francisco April 23. He was 86. Mr. Miller was founder and chairman of the board of Pacific Lighting Corp. and a long time director of Pacific Gas and Electric Co. He began his career in San Francisco in 1883.

● **F. S. Benson,** 56, Pacific Gas and Electric Co. engineer, died April 18 in his office at San Francisco following a heart attack. Mr. Benson joined PG and E in 1919. He was the author of electrical engineering textbooks and technical articles on electrical distribution and substation design including parts of the McGraw-Hill power plant series; delivered many papers before the AIEE, PCEA and student groups. He was chairman of the San Francisco Section AIEE in 1938; was a member of the American Association for the Advancement of Science, the Institute of Radio Engineers, the Engineers Club of San Francisco and the San Francisco Electric Club. He was secretary of the San Francisco-Oakland Bay Bridge railway design group and for two years a member of the San Francisco Engineering Council.

● **E. W. Lauer,** partner in Atlas Electric & Engineering Co., San Francisco electrical contractor, died April 21.

W. W. Glosser

● **W. W. Glosser,** vice-president and director of Hubbard & Co. and manager of the Pacific Coast Division, died suddenly at Phoenix, Ariz., late in March. He was with J. V. Smith, Hubbard president, who was vacationing in Phoenix. Mr. Glosser was born in Batavia, N. Y., in 1887, had been with Hubbard since 1927. Previously he had been with the New York Central and the P & M Co. and Verona Tool Co. He was transferred to the Pacific Coast as manager of the Emeryville plant in 1928, was made a vice-president in 1942 and a director in 1948.

● **John Harrison Smith** died suddenly in Seattle recently. He has been a resident of British Columbia since 1909 and was well known in the electrical contracting trade. He first joined the B. C. Telephone Co., working in Nanaimo, Coquitlam and Cloverdale. For 27 years he was with Hume & Rumble Ltd. and in 1948 joined Morrison-Knutson in construction of the Kitimat line in connection with the Alcan project. While with Hume & Rumble Mr. Smith was superintendent of the Elk Falls power line to Nanaimo.

● **Lucius Beardsley Fuller,** retired chief engineer of Utah Power & Light Co., aged 72, died April 10 in Salt Lake City. Born in 1879 in Nelson, Ohio, he was a graduate of Cornell University and became affiliated with the former Telluride Power Co. in Provo, Utah. He joined Utah Power in 1913 and was credited with development of the hydro system on the Bear River. He was a member of AIEE also until the time of his retirement.

● **Frederick Elwell,** 78, superintendent of all British Columbia Electric hydro power houses for 15 years before his retirement in 1940, died late last month at Coquitlam, near Vancouver. A BCE employee for 29 years, he served as superintendent of the Lake Buntzen power house from 1911 until his appointment as general power house superintendent in 1925.

● **James Edward MacDonald,** retired about four years ago as an electrical inspector in Los Angeles, died April 4. He had been an inspector for over 25 years, had taught code classes to apprentices and after retirement was assistant business agent for local B-11, IBEW.

● **Blaine D. Grey,** electrical contractor and former city electrical inspector of Salt Lake City, died April 10, aged 69. Born in Nevada, he was a graduate of the University of Nevada. Soon after graduation he went to Salt Lake City and established an electrical contracting business. He was chief electrical inspector for eight years.

● **Samuel A. Nemetz,** 61, died at Vancouver General Hospital. Mr. Nemetz went to Vancouver, B. C., 20 years ago, and engaged in electrical contracting. At the time of his death he was president of Great West Electric Ltd.

● **Frederick Elwell,** Mission City, B. C., died at Coquitlam. He was with the B. C. Electric Railway Co. for 29 years, serving as superintendent of the company's power house at Lake Buntzen from 1911 until 1925, when he was named general superintendent of all power houses of the company. Mr. Elwell retired in 1940.

● **C. Dent Slaughter,** remembered by oldtimers in San Franicsco from the time he was very active in trade circles there prior to 1933, died in New York City, April 14, after a long illness. He was assistant sales manager of Anaconda Wire & Cable Co. at the time of his death, having represented that company in the Bay Area until called East.

● **Arnold Edison Haire,** 41, an electrical engineer with City Light at Tacoma, Wash., died there March 20. He served in the Navy during World War II, retiring with the rank of lieutenant commander. He was a member of the American Institute of Electrical Engineers.

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PROFILES

William C. Mullendore, right, Southern California Edison president, is given the Southern California Financial Writers' annual certificate of merit by Association President Herbert Weinstock. The award was made "for business, educational and civic leadership, devotion to truth and integrity in business and government, and service to all the people in his fight to preserve the American Way of Life"

Paul B. McKee, left, president of Pacific Power & Light, receives for his company the Western regional award of the U. S. Chamber of Commerce as best sponsor of Junior Achievement for 1951. Edgar W. Smith, president of the Portland Chamber, made the presentation. PP&L competed with some 100 Western companies sponsoring Junior Achievement, national nonprofit group organized to provide business experience for the high school students

Utility Officials Receive Awards for Civic Contributions

John E. Loiseau, center, president of Public Service Co. of Colorado, received top award from Freedoms Foundation for his company's exhibit, "The Colorado Story." This is the first time a utility company has won the award, which is granted for outstanding methods of preserving and inspiring action to improve the American Way of Life. Presentation of the award and $1,500 was made by Kenneth D. Wells, left, president of Freedoms Foundation, in the University of Denver student union building. Dr. Robert A. Millican, right, president of California Institute of Technology, gave the main address at the ceremony for the 13 people receiving regional awards

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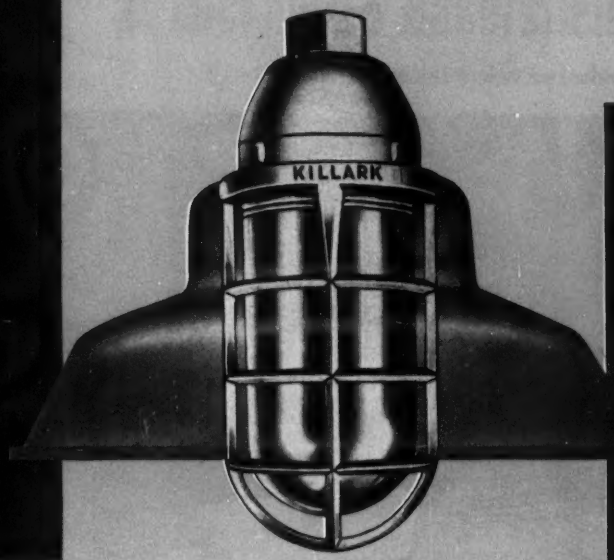

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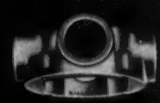
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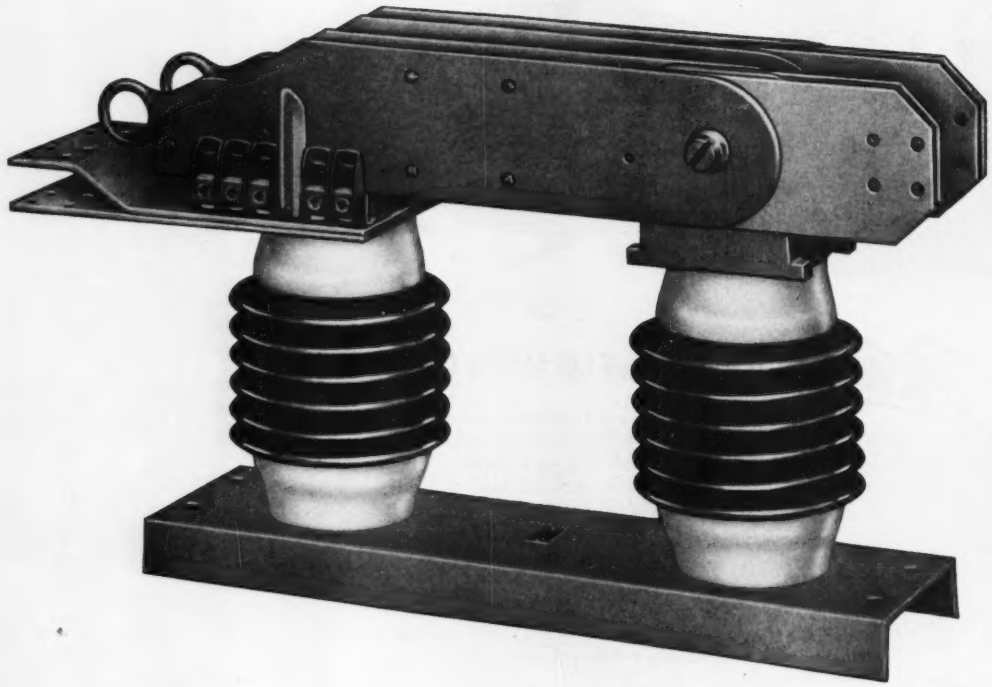

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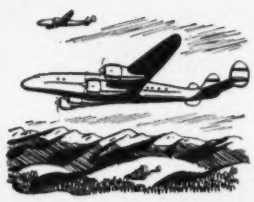

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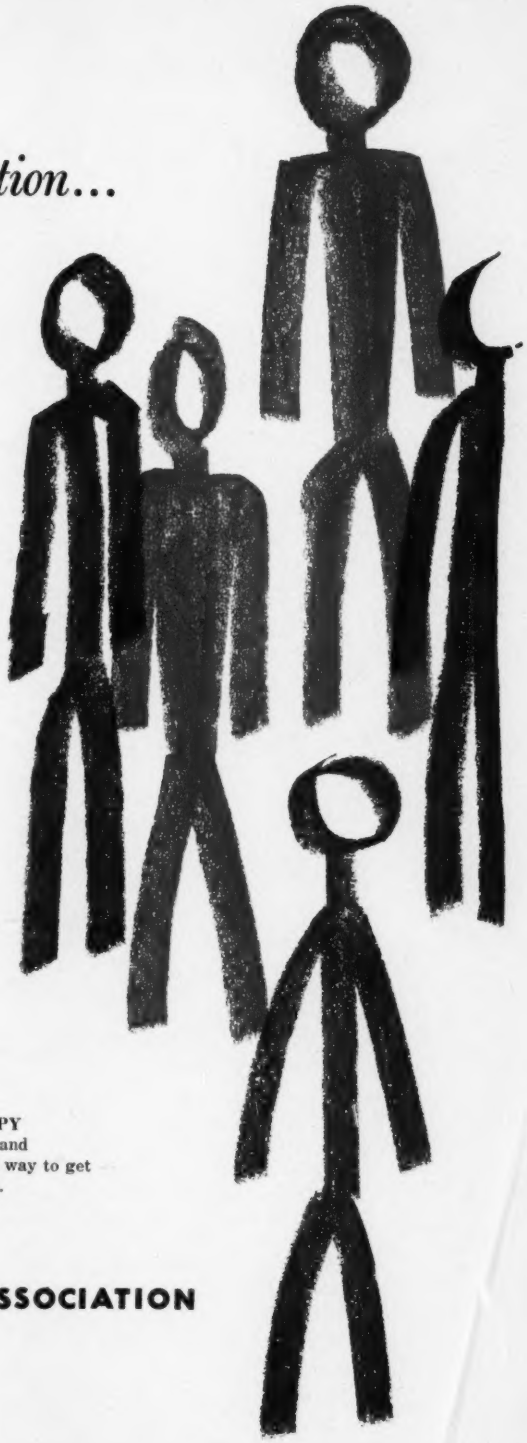

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